

The Ship of the Line in Battle

III, 213

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BY

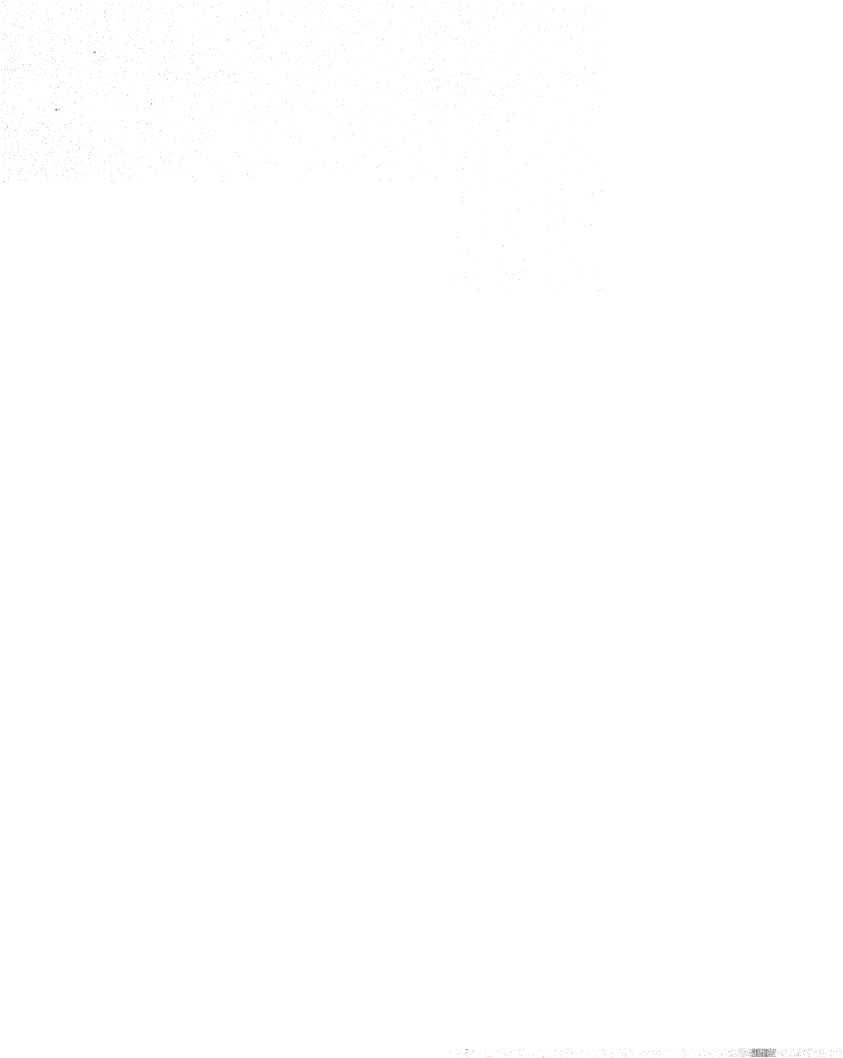
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K.C.B., K.C.M.G., C.V.O.

"Armis munimenta, non munimentis arma tutæ esse debent."—LIVY

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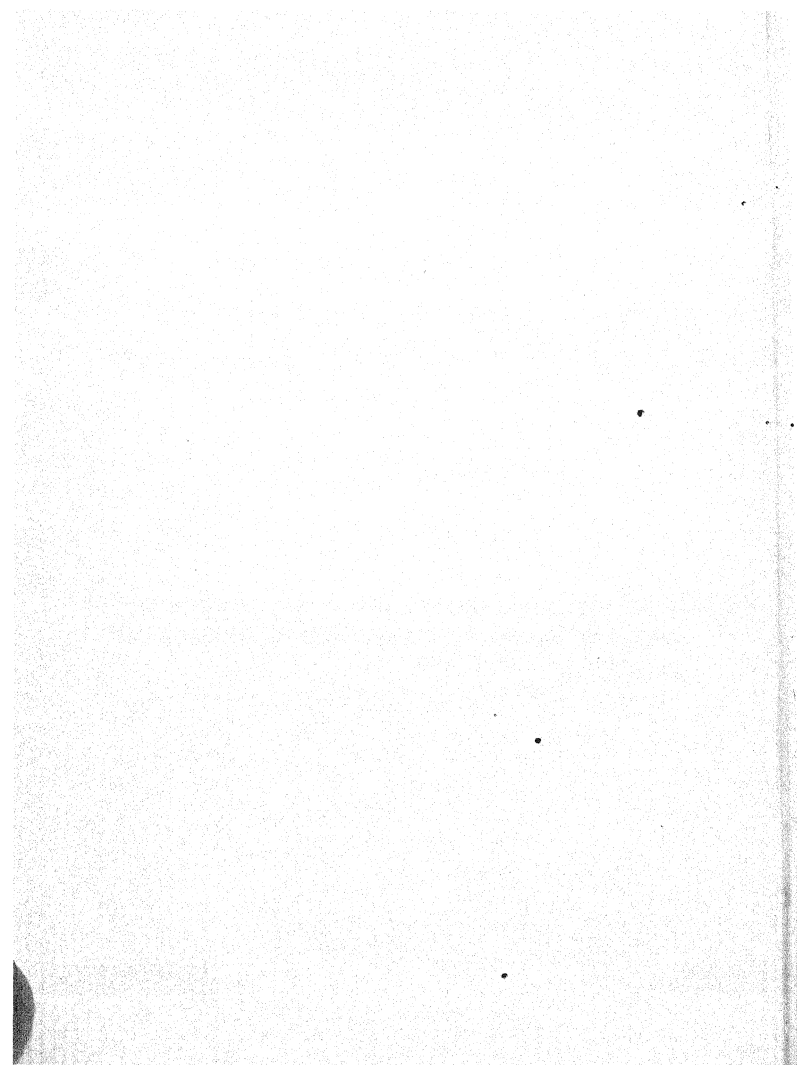
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INTRODUCTION.

THIS volume contains a series of papers read at the Royal Naval War College, Portsmouth, from time to time during the past three years. They were called into being by the inconclusive character of the arguments usually advanced for and against different designs for ships of the line, and by the total absence of any accepted principles to govern the nature of the armament, the amount of protection and the speed. It seemed to the author that if the war facts were examined and set forth they might disclose some military principles which should tend to focus thought, steady opinion, and even guide the naval architect in his designs. The reader will judge whether that object has been approached to any material extent.



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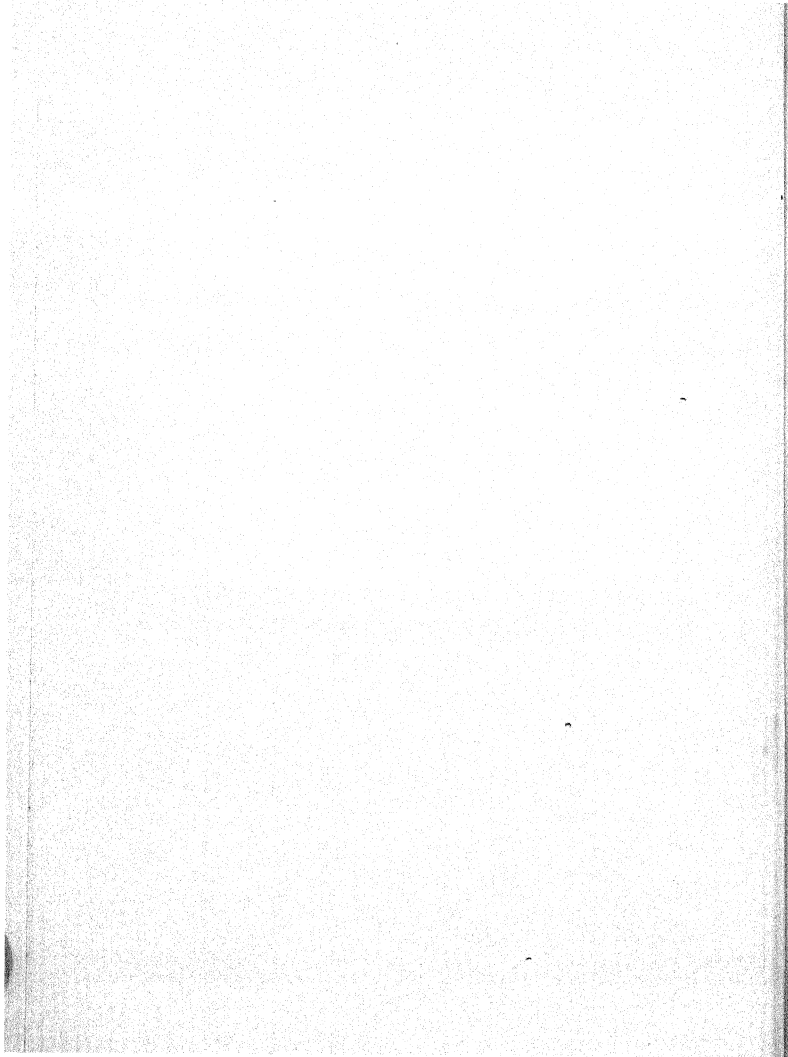
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I.

FROM TRAFALGAR TO THE INTRODUCTION OF ARMOUR.¹

IN a sea-fight the object is, at all ranges and in a given time, to strike blows greater in number than those received.

Each blow must be effective, but not unnecessarily powerful, since the use of a gun heavier than is necessary means a reduction in the number of guns carried and, therefore, in the number of blows struck.

The armament of each ship should be sufficient, but not more than sufficient, to do the work, as otherwise power would be wasted, and her destruction would involve the loss of an excessive proportion of the total fleet.

In the light of these maxims it is proposed to examine the changes in the fighting power of the capital ship since the battle of Trafalgar..

In the Nelsonian era the most powerful instrument of war at sea was the three-decker. She grew out of the fact that the fire effect of a large number of short-range guns can only be concentrated at an effective range by concentrating the guns themselves in three, or even four, tiers. The effective range during the great wars with France was very short. The guns could only hit at point-blank ranges with any approach to certainty, owing to their general inaccuracy and to the want of "sights" with which to adjust the elevation. The

¹ Read on the 11th of April 1910.

lighter guns in use also lacked penetrating power even at close quarters. The power of the three-decker was shown at the battle of the Nile, where in a little over an hour the *Orient* of 120 guns completely beat, and drove out of the line, the *Bellerophon* of 74 guns with a loss of 197 killed and wounded out of 584.

At Trafalgar the *Victory*, of about 3500 tons displacement, was armed with solid shot-guns and carronades of five different calibres. Her broadside consisted of—

Guns.			Carronades.		Total broadside.
32-pr.	24-pr.	12-pr.	68-pr.	32-pr.	
15	15	20	1	1	52

Her crew numbered about 830. The 32-pounder guns were mounted on the lower deck, the 24-pounder guns on the middle deck, the 12-pounder guns and the carronades on the main and upper decks. The size of the guns carried on the higher decks was limited by considerations of weight and stability.

Carronades were first added to the armaments of ships in the year 1779, during the War of American Independence. They were much lighter and more easily worked than ordinary guns. Thus, the weight of the 32-pounder carronade was 17 cwt. as against 33 cwt. for the medium 12-pounder gun. The objection to them was their relatively short range—*e.g.*, with 5° elevation, 1140 yards as against 1580 yards with the long gun. This limited range made them unsuitable as the sole armament, since there would be a risk of being out-ranged. In several actions this inferiority proved decisive, notably in that between the British *Phæbe* and the American *Essex* in the year 1814, when the last-named ship was armed almost entirely with them and was beaten in consequence. But as secondary guns their range was held to be sufficient, and the great smashing effect of a 32-pounder carronade compared with that of a 12-pounder long gun at short decisive ranges kept them in favour through three great wars, lasting more than twenty years. The introduction of the carronade was a great and far-reaching departure in principle. The necessity for two distinct natures of guns on board a ship was recognised—a

primary armament of long-range guns for distant firing, a secondary armament of short-range guns to increase the effect producible by a given weight of armament at "decisive ranges." Was the principle sound?

The natural instinct of man is to close the enemy he wishes to destroy. With hand-weapons close contact was necessary, but this was not needed with missile-weapons. When the latter were first introduced the side using them gained an advantage in distant fighting. This advantage soon disappeared as both sides adopted missile-weapons, and have retained them in conjunction with hand-weapons to the present day—bows or rifles for use at a distance, swords or bayonets at close quarters. The decisive range increased from close quarters with the hand-weapon to bow- or musket-shot distance when one side only possessed the missile-weapon, and then decreased again when the arms were equal. "Decisive range" may be defined as that at which the one combatant develops such a superiority of attack that the other ceases to be able to offer further effective opposition. Long experience has shown that in weapons inequality between nations is never permanent, and that it is necessary to be prepared to fight at any distance.

Turning to the particular case of a ship's armament. The object is to defeat the enemy, and to arm the ship with such weapons that no disadvantage can occur at any distance, since the circumstances are so various that it is not possible always to control the range. The unexpected, or the unforeseen, or the enemy may do that. It is not sound to accept an advantage at one range at the expense of a disadvantage at another. If the armaments are equal in weight, but are unlike, and each composed of guns of one nature, in the one case of guns more effective at long range, in the other of guns more effective at short range, the first ship will have an advantage at long distances and the second at short. Neither armament can be considered ideal. Evidently an armament composed of guns of both natures is the only arrangement which gives no disadvantage to the user at any range. After the great wars of the eighteenth century the armament of two natures of gun was accepted, and was seen at work in the war of 1812—*e.g.*, the American

and British frigates *Constitution* and *Guerrière* each carried 32 long 24-pounder, or 18-pounder, guns besides 22 and 16 32-pounder carronades¹ respectively.

If the armaments are equal in weight and similar, neither side will derive advantage from the weapon itself at any range. The result will be decided at some range inside the "hitting range," or that at which hits are first obtained. The determined man will wish to close to that "decisive range" in order to make his fire tell as quickly as possible. In the Nelsonian era the "decisive range" was close alongside, and hence the short range carronade was certain to come into action. What will be the "decisive range" in the next war? And for a given weight of armament what natures of guns, distributed over a large fleet, will give a maximum effect, at that range with the least disadvantage at any other?

The typical ships built after Trafalgar carried a mixed armament of solid-shot guns and carronades of different calibres. The elements of their fighting power were—

	Displacement.		Guns.				Carronades.		Total broad-side.
	Tons.	Crew.	32-pr.	24-pr.	18-pr.	12-pr.	32-pr.	18-pr.	
120-gun 3-decker	4600	890	16	17	17	4	6	1	61
74-gun 2-decker	2970	600	14	...	14	3	6	...	37
38-gun 1-decker	1460	300	...	...	14	2 ²	8	...	24

The approximate proportion of weight, or displacement, absorbed by the principal components were—

Hull	.	.	.	.	54.5 per cent.
Armament	.	.	.	.	10.5 "
Equipment, including motive mechanism or apparatus	}	.	.	.	35 "

Thirty years later—1838—the newest typical ships had been designed to carry a uniform armament of 32-pounder solid-shot guns varying in length from 9½ feet to 8 feet, in weight from 56 cwt. to 42 cwt., and in charge of powder from 10 lb. to 6 lb.

The carronades and the lighter long guns had given way

¹ *Guerrière* carried also one 18-pounder carronade.

² 9-pounders.

to short 32-pounders, but the two natures of gun principle survived in a modified form. The broadside still included a primary armament of long guns as well as a secondary armament of short guns inferior in range. The elements of their fighting power were—

Name	Ship.	Class.	Displacement. Tons.	Crew.	Total. broadside. 32-pr.
Queen	.	110-gun 3-decker	. 4500	900	55
London	.	92-gun 2-decker	. 4100	890	46 ¹
Vernon	.	50-gun 1-decker	. 2560	500	25

These one-calibre gun ships represented the final effort of the solid-shot era. Both the three-decker and the two-decker were more powerful than the *Victory*; the one-decker was still much less powerful than the ship of the line.

But the solid shot was not a very formidable projectile. A large number of hits were required to defeat a well-disciplined crew. Thus, in the year 1816, at the battle of Algiers, which lasted about seven hours, the *Impregnable* of 98 guns was said to have been hit upwards of two hundred and thirty times, including several between wind and water. Her loss was 210 killed and wounded out of a crew numbering about 750; but her crew was not beaten, and she still floated and reached Gibraltar in safety. The results may be usefully compared with those produced on the armoured cruiser *Gromoboi* in the action between the Russian and Japanese squadrons on the 14th of August 1904, which lasted four and a half hours. That ship lost 259 killed and wounded out of a crew numbering about 800, and it is believed was hit in all parts less than ninety times.

Owing to the introduction of shell guns these one-calibre armaments lasted a very short time, and were soon replaced by mixed calibre armaments. In the year 1822 the French General Paixhans proposed that shell instead of solid shot should be fired from ships' guns. Two years later a French Commission reported, after inspecting the damage done by shells fired experimentally at a wooden line-of-battle ship, that such a vessel could be easily set on fire by such pro-

¹ Includes one 68-pounder carronade.

jectiles; that the effect produced by them was so terrible that one or two bursting between decks would probably compromise the fighting power of the ship attacked; and that if they lodged and burst in the timbers near the water-line the ship would be liable to founder. The French experiments were followed by others carried out by the British Government at Portsmouth in the year 1838, and at Woolwich in the year 1850, which were reported at the time to show the "terrific" effects of shell-fire on a ship when the shells take full effect. These reports proved to be true in part, but exaggerated the effect likely to be produced by one or two shells. Subsequent war experience has shown that ships, whether built of wood or iron, can be set on fire by shell in sufficient numbers, but that in small numbers there is little difficulty in extinguishing the fire; that as compared with solid shot a smaller number of shells burst on board a ship are probably sufficient to defeat the crew; that hits near the water-line are liable to compromise the safety of the vessel, but that the chances of such hits are less than were supposed, and that their effect can be neutralised to some extent by suitable arrangements.

Experiments carried out in June 1850 against a target representing the section of an iron ship of the period merit attention. The conclusions were that two or three shot, or sometimes even a single one, striking near the water-line, must endanger the ship. Also, that the large number of pieces into which the shot broke up on impact, together with the fragments of plating, frames, and rivets, formed mitraille dangerous to the guns' crews. Practice-ground experiments had led to this conclusion—

Ships were liable to founder when struck near the water-line by shell, if built of wood, and by shot, if constructed of iron. The guns' crews ran great risk of being disabled by fragments of shell in wooden ships and by pieces of shot in iron ships. Ships built of wood were liable to be set on fire. In consequence of these experiments iron ships were condemned for the purposes of war, and several such ships already built were declared to be unfit as warships and were converted into transports. The experts with their eyes on the practice-ground targets magnified the risks. No one

pointed out that the true and most effective way to reduce the dangers was to beat down and silence the enemy's fire.

On other points opinion was divided as to the relative merits of solid-shot and shell guns. The "Two natures of gun principle" was again raised in another form. Owing to the use of lighter charges of powder shell guns were slightly inferior in range, accuracy, and penetration—*e.g.*, with 5° elevation the range with the shell gun was 1760 yards against 1960 yards with the solid-shot gun. The shell guns were more destructive in their effect. The general conclusions were that "a mixed armament of solid-shot and shell guns was required,—the first for distant-firing, the second for close action. The destructive effects of shell-firing at short ranges would tend to cause actions at sea to commence at great distances and to be conducted with circumspection. Unforeseen conditions might lead to actions beginning at close ranges."

These conclusions were practically identical with those reached seventy years earlier. They pointed to an armament based on the two natures of gun principle.

In the year 1859 action was taken to meet the increasing power of the gun attack, and to give effect to the proposals having that object made by General Paixhans a generation earlier. Large one-decked ships, some of which were armour-clad, were introduced to replace the two- and three-deckers. It is the similarity between the conditions of to-day and those of 1859 which renders the French report of 1824 and the later British experiments of interest at the present time. Now, as then, the power of a capital ship's broadside is overwhelming, and the tendency is not only to exaggerate the importance of experiments made with single shell, but to forget that the object of gun-fire is to silence the enemy's guns and to disable men rather than to destroy ships.

The Crimean War of 1853-6 acted as a check on peace experiments. The chief events which bear on our subject were—

1. The destruction of a Turkish squadron by a very superior Russian force at Sinope, on 30th November 1853.

2. The attack on Sebastopol by the Allied fleets, on 17th October 1854.
3. The attack on Kinburn by the Allies, on 17th October 1855.

SINOPE.

A Turkish squadron of

5	sailing frigates,	each carrying from 50 to 60 guns.	
2	"	"	" 36 " 40 "
3	"	corvettes	" 20 " 24 "
1	steamer,	armed with	16 "
1	"	"	4 "

was lying at anchor in Sinope Bay, unskilfully placed under the shelter of four small ill-found batteries armed with 20-pounder and lighter guns. The united single broadsides of these ships numbered 216 guns, of which the heaviest were 24-pounders, and none fired shell. These Turkish ships were attacked by a Russian squadron of six wooden sailing ships of the line, supported by two frigates and three steamers which seem to have taken little part in the action.

The broadsides of the six ships of the line were—

	Ship's name.	68-pr.	36-pr.	24-pr.	18-pr.
3-deckers	Paris	14	36	12	...
	Grand Duke				
	Constantine	14	36	12	...
	Tri Sviatitelya	...	48	12	3
2-deckers	Tohesme	2	30	10	3
	Empress Maria	4	28	10	...
	Rostislav	4	28	10	3
		38	206	66	9

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Shell were fired from the 68-pounder and possibly from the 36-pounder guns.

As the Russian ships bore down to engage fog and rain are said to have obscured them from the Turks until the distance was reduced to about half a mile. The Turks opened fire, whereupon the Russians shortened sail, rounded to, and anchored in a position such that the distance between

the flagships of the admirals in chief command was about 500 yards. During this operation the Russians suffered some loss from the Turkish fire. After anchoring, the Russians returned the fire with such effect that the Turkish guns were soon silenced. Two frigates were blown up during the action, the remainder were driven on shore, and burnt either after the action or on the following day. One steamer escaped. The Russian loss was 264 killed and wounded; that of the Turks was said to have been 2700 out of 4200, but this was probably an exaggeration.

At the time erroneous conclusions were drawn from this action. The stress wrongly laid on the effect of shell-fire found expression in the great professional cry of the period: "For God's sake keep out the shell."

No one seemed to realise that the change of projectile had not altered the fundamentals of the problem, that the most powerful armament had won, and that, as has since been abundantly shown, the enemy's shells could be kept out in the old way by beating down his fire and silencing his guns.

The decisive cause of the Russian victory was the great superiority in the number—319 to 216—and power of the guns they brought into action. The use of shell by the Russians as against solid shot by the Turks was only a secondary cause. The incendiary effect of the Russian shell seems to have been less than had been anticipated, seeing that the greater number of the Turkish ships destroyed are said to have been set on fire after the action ceased.

SEBASTOPOL.

The attack on Sebastopol by the Anglo-French fleet on the 17th October 1854 was indecisive. All the ships were built of wood, and were fought at anchor, those ships which were not provided with steam-power being towed in and out of action by steamers. Fourteen French and two Turkish ships of the line, whose broadsides numbered 746 guns, engaged, at ranges varying from about 1500 to 2100 yards, 73 Russian guns mounted on three forts—No.

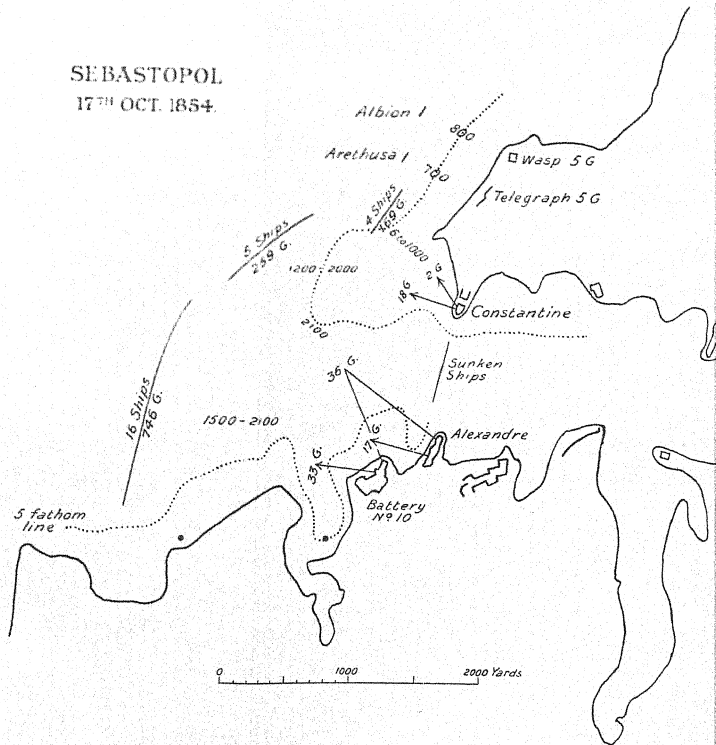
10, Alexandre, and Constantin. At the same time five British ships of the line attacked with 259 guns, at ranges varying from about 1200 to 2000 yards, Fort Constantin, which replied with 18 guns, supported by 36 guns from the forts No. 10 and Alexandre at a mean range of about 2100 yards. Four other British ships of the line with 169 guns also attacked, at ranges from about 800 to 1000 yards, Fort Constantin, which could only bring to bear in reply two guns, but was supported by the fire of 13 guns from forts No. 10 and Alexandre at a mean range of about 2150 yards. These four ships were also exposed to the fire of ten guns mounted in the Wasp and Telegraph Batteries—five in each—on a cliff about 110 feet high, the range being some 800 to 1000 yards.

The *Albion*, with some 45 broadside guns, engaged the 5 guns of the Wasp Battery at about 800 yards, and the *Arethusa*, with 25 guns, the Telegraph Battery at about 700 yards. Towards nightfall the Allied fleets withdrew after being engaged some five hours. They had brought into action some 1200¹ guns against 152 of the Russians, the former not differing greatly in power from the latter. The Allies had 525 killed and wounded against 138 Russians, but these numbers include mere contusions. The heaviest losses were the 81 of the *Albion*, the 70 of the *Sanspareil*, and the 46 of the *Ville de Paris*, which are very small compared with those of the *Bellerophon* at the Nile and the *Impregnable* at Algiers. Except Fort Constantin, the Russian batteries were little injured. Several ships were set on fire by red-hot shot; many were hit by shell, and some were set on fire by their explosion, but these fires were extinguished without much difficulty. It is true that four ships somewhat prematurely withdrew. This is accounted for by the Commander-in-Chief's order directing any captain to haul off without delay if he found his ship in very particular danger. The order indicates that there was no intention to press the attack home, and is in con-

¹ To allow for guns not fought, owing to the absence of men in the trenches, some reduction is required in the number of guns brought into action by the fleet. This reduction is partly balanced by the guns of smaller ships engaged and not included in the numbers given.

SEBASTOPOL

17TH OCT. 1854.





trast with that of Farragut at New Orleans, that "No vessel must withdraw from battle under any circumstances without the consent of the flag officer." The *Albion* and *Arethusa* alone had to be sent to Constantinople for repairs; the remainder of the fleet were practically unharmed. It is evident the ranges were for the most part too great. The greatly superior gun-power of the fleet—8 to 1—was wasted. Decisive results at that time could not be expected outside 1200 yards.

The action proved that the experimental results produced by shell had been much exaggerated and had not stood the trial of war, just as test-tube experiments are found to fail when applied to the complex mechanism of the human body. However terrible may appear the effect of a single shell in a peace experiment, decisive results in war are only to be obtained by a superior volume of fire at "decisive ranges," as at Sinope. This truth was afterwards confirmed by more than one severe action during the American Civil War.

KINBURN.

In modern times the French Navy was the first to use armoured ships in battle: the occasion was the attack on Kinburn, and the date the 17th of October 1855. The ships—*Dévastation*, *Lave*, and *Tonnante*—were built of wood, and their sides were coated with 4.3-inch iron plates; their armament on each broadside consisted of eight smooth-bore *canon de 50* (56 lb. English) behind armour on the main deck and one *canon de 12* unprotected on the upper deck. Their displacement was 1650 tons, and their speed under steam about four knots. They were intended for use against forts, and were really floating batteries and not sea-going ships in any sense. So little were they self-dependent that they had to be towed from port to port.

Kinburn Peninsula forms the right-hand or southern shore when entering Kherson Bay, and terminates in a long narrow spit, which points north-west, and is so placed that its south-west side faces the open sea, while its north-east side looks across the Channel leading into the Bay.

In the year 1855 this spit was defended by three fortified works. Fort Kinburn was an irregular, four-sided, bastioned, and casemated work about 2800 yards from the end of the spit. The work extended right across from sea to sea, and its south-west and north-east faces followed their respective shore-lines. The armament included about 60 guns and mortars.

On the end of the spit was a 10-gun earthwork. Midway between the spit battery and the fort was a second 10-gun earthwork. The precise nature of the armament is not known, but it is believed that 24-pounders¹ were the largest guns mounted. The garrison of the three works numbered some 1500 all told.

On the 14th October 1855 the combined Anglo-French expedition, consisting of ten ships of the line besides frigates and small craft, anchored off Kherson Bay. To prevent the arrival of reinforcements or the escape of the garrison troops were landed on the peninsula eastward of the forts on the following day. On the 17th inst., about 9.30 A.M., the wind being northerly and the water smooth, three armoured floating batteries moved into position from 900 to 1200 yards south-west of Fort Kinburn and opened fire; twenty gunboats, armed with 35 heavy guns, engaged at various ranges inside and outside Kherson Bay; and eleven mortar-boats threw their heavy shell into the fort from a distance of about 2800 yards.

The fire from 16 heavy mortars and 59 large guns—smaller guns omitted—at moderate ranges was so effective against the very feeble fire in reply, that before noon the buildings in the interior of the fort were in flames, and the south-eastern or land face had suffered very considerably, but the Russian fire had not been silenced.

At noon the heavy ships weighed and moved in to the attack. Nine ships of the line advanced in line abreast, and anchored on a line of buoys placed one cable apart and about 1200 yards or less from the enemy's works. Six ships brought 241 guns—in addition to the 75 guns and mortars already in action—to bear on Fort Kinburn; three

¹ Some accounts say 32-pounders.

others and a frigate opened with 158 guns on the centre battery; while three frigates and one ship of the line attacked the spit battery with 88 guns. At the same time a light squadron of three French and eight British ships forced the entrance, and with 80 guns took the batteries in reverse at short ranges. As the ships moved in the batteries opened a brisk fire, but in a very short time—five minutes, according to Captain Mends, Sir Edmund Lyons' Flag Captain—after the ships brought their broadsides into action the Russian fire was completely silenced by the overwhelming number of guns playing on them. The place surrendered. The Russian loss was stated to be 45 killed, 130 wounded, and about 1400 prisoners. The British casualties were only 2 wounded; those of the French were 27, of which 8 occurred on board *Dévastation*, and 9 on board *Tonnante*.

The victory was due to the use of guns at "decisive ranges." The Allies brought into action upwards of 630 guns against 81—8 to 1, about the same proportion as at Sebastopol. They used 8-inch and 32-pounders, or their French equivalents, with a proportion of heavier guns, against 24-pounder and lighter guns. The 24 *canon de 50* mounted behind armour were really quite secondary. The Commander-in-Chief, Sir Edmund Lyons, wrote of the French floating batteries—

They may not have contributed so much to the fall of the place as the mortar vessels and the gun vessels, nor can it be denied that the *coup-de-grâce* was given by the ships of the line, but it is nevertheless certain that in two or three hours' more firing they would have brought the walls down by the lump, and the whole sea-face would have been accessible, whilst the only effect upon them was the appearance of a few rust-like marks where the shot struck and bounded off.

The *Dévastation* was reported to have received 29 hits on the hull and 35 on the deck, the *Tonnante* 55 on the hull and 10 on the deck; three projectiles entered the battery of the *Dévastation*, killing or wounding 8 men, 2 entered that of the *Tonnante* injuring 9 men. The injury sustained by the *Lave* is not known.

Sir Edmund Lyons' words mean that the 24 guns protected by armour might have completed in five or six hours and with some loss what was actually done in as few minutes by the larger number of guns in the fleet without any loss. Men saw the shot-marks on the armour and understood its protecting qualities, but they altogether failed to realise the defensive power inherent in a superior gun-fire, which leaves no marks except the destruction of the enemy.

The results of the action have been momentous. On that day was developed the theory that a small number of guns protected by armour are more effective than a greater number without armour; that to protect yourself is more important than to destroy the enemy; that in battle the defensive is superior to the offensive. Hence came so-called impenetrable ships with few guns; coast-defence ships, coast fortifications, defence mines, &c., in exaggerated proportions. It is for the reader to consider whether that theory has or has not been justified by war experience.

Remembering that these ideas were working in the minds of men, we can pass from the ships of the year 1838 to those of the year 1859, when steam propulsion had been introduced, and ships had been further increased in size and power. By that time shell had been supplied for use in all guns, and some 32-pounders had been replaced by heavier guns specially suited to fire shell. In the year 1859 the elements of the fighting power of the latest typical ships were—

		Displacement. Tons.	Crew.	8-in.	Guns. 32-p. 56 cwt. 42 cwt.			65-p. broad- side.	Total
Howe	121-gun 3-decker	6900	1130	32	17	11	1	61	
Conqueror	101-gun 2-decker	5400	950	19	19	12	1	51	
Emerald	51-gun 1-decker	3900	570	15	10	...	1	26	

Both dimensions and displacement had largely increased, but the percentage of the weight, or displacement, absorbed by the hull, armament, equipment, &c., was still nearly the same as in the year 1838—viz.:

Hull	.	.	.	.	about 54.5 per cent.
Armament	.	.	.	.	" 10.5 "
Equipment, including motive mechanism	.	.	.	.	" 35 "

KINBURN 17TH OCT. 1855.

1 Ship
45 guns

Ochakov Fort

11 Ships
60 guns

3 Ships
43 guns

Battery
10 guns

4 Ships
158 guns

Battery
10 guns

5 British Gun-boats
5 guns

6 Ships
241 guns

4 French Gun-boats
8 guns

Fort
Kinburn
60 guns

3 Iron clads
24 guns

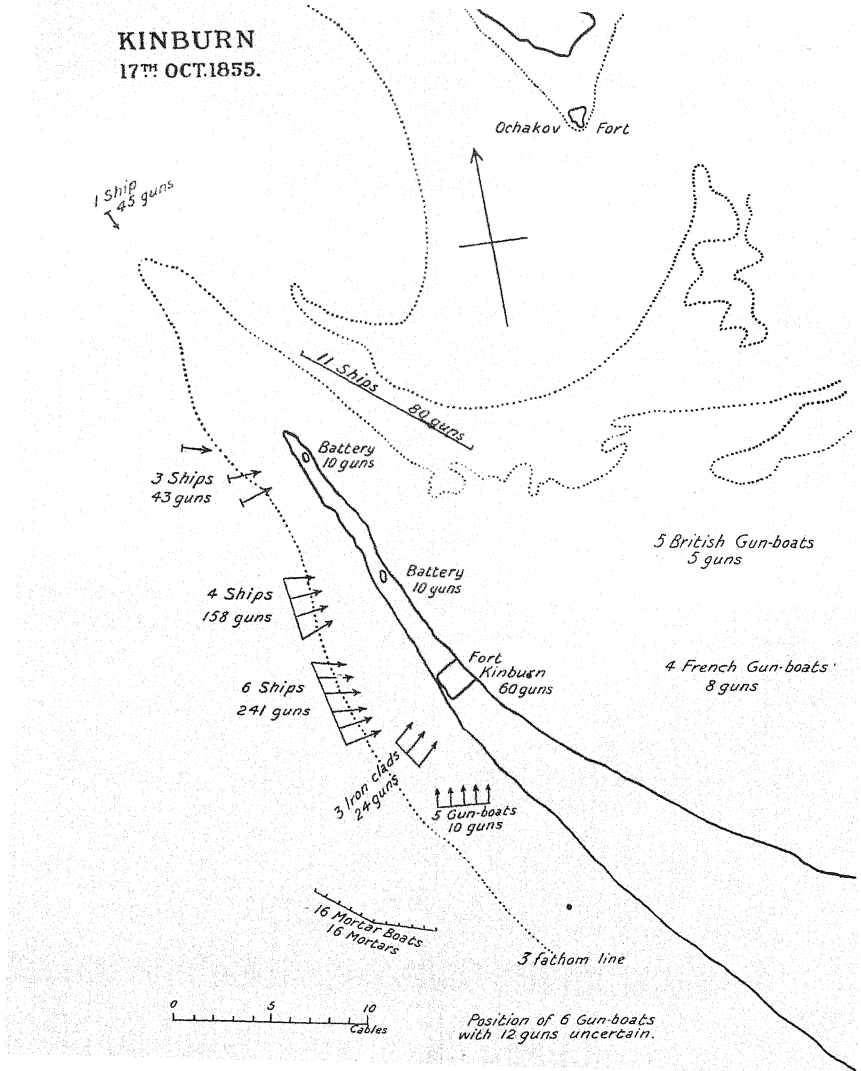
5 Gun-boats
10 guns

16 Mortar Boats
16 Mortars

3 fathom line

0 5 10
Cables

Position of 6 Gun-boats
with 12 guns uncertain.

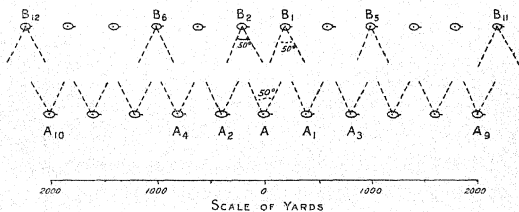




The only difference was that weight, which in the sailing ship of 1838 had been given to water and iron ballast, was largely transferred to engines and coal in 1859.

Apart from their steam propulsion the salient fact about these ships was the very great power of their broadsides as compared with those of the *Victory* and the later ships of the solid-shot era. This was due not only to the weight of metal thrown, but to the use of shell, as already pointed out. Sights had been fitted to the guns, and in consequence hits could be made at ranges beyond point-blank. The guns in use could drive shell through the side of any ship, and burst them inside her, at ranges up to 1200 yards or even longer distances.

Diagram I



In fact, Crimean War experiences tended to show that the "decisive range" had grown beyond the Trafalgar limit to somewhere inside 1200—say 800 yards. This was confirmed in the year 1864, when the Danes defeated the Austrians off Heligoland at ranges decreasing from 1200 to 500 yards. In this case both sides used mixed armaments of smooth-bored and rifled guns.

Diagram I. has been drawn on the assumption that the "decisive range" had become 800 yards, which was about the range at which the *Alabama* and *Kearsarge* fought on the 19th June 1864.

A, A₁, A₂,.....and B₁, B₂,.....represents two fleets in single line ahead, the ships on either side two cables apart, and

each able to bring all its guns to bear on an enemy within 25 degrees of the beam bearing. To provide for unsteady steering the angle is somewhat less than that through which the guns could be trained.

It will be seen that two ships can concentrate their fire on one—*e.g.*, B_1 and B_2 on A , also six ships B_3 B_6 on five A_3 A_4 , and again twelve ships B_{11} B_{12} on eleven A_9 A_{10} . This was not possible during the Nelsonian era, when the "decisive range" was close alongside. It was becoming less necessary to mount guns in three tiers in order to concentrate their effect. The reason for the existence of the three-decker was passing away. But this was not all. Excessive concentration of the guns themselves in three-deckers was held to be a source of weakness, as the targets the ships presented were large, the danger of mutual destruction by shell fire was thought to be great, and the loss of one such ship removed no small proportion of the total fleet.

The reputed failure of the three-decker, caused by the growth in the range and power of the gun, raised the whole question of arming capital ships. On what principles should such ships be armed? What natures of guns should be used? In what class of ships should they be mounted? The choice lay between two opposing policies—the one based on the offensive, and aiming at striking down the enemy, the other founded chiefly on the defensive, and looking to a reduction in the risk incurred. The questions are still undecided, and remain of living interest. The underlying principles are precisely the same now as they were fifty years since. To examine them in the light of the past will be some guide for the future.

The first policy aimed at developing gun-fire to the full extent while spreading the risk, and recognised that to silence the enemy's guns was the best defence. Under it skill in shooting would have become very important, and as the gun and the appliances for working it were developed, "decisive ranges" would have increased gradually instead of remaining at a standstill for nearly a generation. The first policy demanded a careful balance between size and numbers when selecting the natures of gun to be used, coupled with

the maximum dispersion of guns compatible with concentration of their effect. It called for a spread of the risk as well as for a maximum fire effect.

The nature of gun was ruled by the condition that the maximum number of effective hits must be made in a given time, not only at long distances but also at "decisive ranges." This involved two conflicting demands—

1. Not to be out-ranged at long distances.
2. Not to be out-numbered and smothered at short ranges.

Fifty years ago long guns ranged farther than short ones, and solid shot farther than shell (Table A., p. 21). Again, large guns were effective at long distances, whereas small ones were less so owing to want of penetration (Table B., p. 21).

But the fire from large guns was slower, and fewer of them could be carried, so that at short decisive ranges the ship armed with small guns made a greater number of hits, and, as Sinope showed, these hits were effective.

A dispersal of guns within reasonable limits spreads the risk and makes the enemy's task more difficult, since, in order to silence them, he must either disperse the effect of his own fire or concentrate it on a few of our guns leaving the others unfired at. No loss of fighting power will follow, provided the dispersal is kept within such bounds that there is no loss of concentration of effect. The limits of dispersal depend chiefly upon the "decisive range" and upon the arcs of training the guns (*vide* Diagram, p. 15).

The relative merits of large guns against small ones, and of dispersion *versus* concentration, will be best seen by examining a concrete case. About the year 1859 had been launched in Great Britain and in the United States a new class of one-decked steamer. The British *Mersey* of 40 guns may be taken as the type, and may be usefully compared with the *Conqueror*, the latest two-decker, of 101 guns.

The elements of their fighting power were—

Ship.	Dis- place- ment. tons.	Crews.	Broad-side.		Weight.	Length.		Weight of		
			No. of Guns.	Size.				Shot.	Shell.	Burster.
Mersey, 40-gun, 1-decker	5490	600	14	10-in.	85	9	4	84	84	6½
			7	68-pr.	95	10	0	68	51	2½
			19	8-in.	65	9	0	56	51	2½
Conqueror, 101-gun, 2-decker	5400	950	19	32-pr.	56	9	6	32	24	1½
			12	32-pr.	42	8	0	32	24	1½
			1	68-pr.	95	10	0	68	51	2½

The advent of the *Mersey* class was due to the "shell scare" of the period, which overrated the effect of shell and the danger from fire, while underrating the advantage given by a larger number of effective guns at "decisive ranges."

These heavy one-decked ships were of the same, or even greater, displacement than the two-deckers, and carried large crews of 600 men or more. Although called frigates they were really capital ships, since their fighting power was so large that their absence from the battle would have been felt. The limited "decisive range" of the time restricted the number of *Merseys*, and therefore the number of guns which could be brought into action against a given number of *Conquerors*. The *Mersey's* guns were heavier, but she could only fight twenty-one against the fifty-one of the *Conqueror*. With twelve *Merseys* against eleven *Conquerors* the numbers would have been 252 guns against 561. On the other hand, the *Mersey* presented a target only about 21 feet high compared with the 28 or 29 feet of the *Conqueror*, an advantage to the one-decker. The loss in the number of guns, which could concentrate their effect, was balanced to some extent by an increase in their size, but the attempt to spread the risk by dispersing the guns in one-deckers was premature. With long-range guns a limited dispersal would have been quite feasible. The relative fighting power of the two classes of ships was never tested in battle, and must remain more or less an open question. We can only trust to the indirect evidence of actions fought since that day.

On the general subject of fighting between unarmoured ships fifty years since some light is thrown by the action between the *Alabama* and *Kearsarge* already mentioned. These steam sloops were each of about 1550 tons displacement. They brought into action—

Alabama.

5 32-pounders of 52 cwt.
1 8-inch.
1 100 pounder.*

7

Crew, 149.

Kearsarge.

2 32-pounders.
2 11-inch.
1 30-pounder.*

5*

Crew, 163.

The *Alabama* had one 32-pounder, and the *Kearsarge* two 32-pounders, idle on the off side.

All the guns were smooth-bores except those marked *, which were rifles.

The *Alabama* issued from Cherbourg between 9 and 10 A.M. on the 19th of June 1864. Both ships stood out to sea beyond neutral waters, the two being about 1½ mile apart and steering the same course. At 10.50 the leading ship, the *Kearsarge*, turned and steered for the enemy. The *Alabama* stood on until 10.57, when she sheered to port, and opened fire with her starboard guns at a range of about 2000 yards. The *Kearsarge's* crew had been trained to shoot at a range of 700 yards. She, therefore, did not reply, but stood on, without being hit, until 11 A.M., when she turned and opened fire with her starboard guns at a range of about 900 yards. The *Kearsarge* turned the wrong way and the ships were now broadside to broadside with their heads in opposite directions. They began to circle round a common centre, the range gradually decreasing to about 600 yards. At noon the *Alabama* ceased firing, surrendered, and foundered at 12.24.

The *Kearsarge* fired 163 rounds. The number of hits made is not known, but her fire was evidently effective. She herself was hit fourteen times in the hull, but suffered no material damage, and had only three men wounded. The chain cables bighted up and down her side abreast of the engines were only hit twice by 32-pounder projectiles, and are believed to have exercised no material influence on the result. The *Alabama's* fire was rapid and wild. Her loss was reported as 9 killed and 21 wounded, but several appear to have been missing, and these may have been either drowned or killed.

The victory was due to superior leading, discipline, and training, which made themselves manifest in the good shooting of the Federals. The natures of the guns used had little to do with the result. It matters little what gun is used if it does not hit. The action was a proof of the well-known maxim that the deciding factor in war is most often the difference in the use which the *personnel* make of the ships and weapons, and not that between the ships and weapons themselves.

We have to note two important facts. First, the *Kearsarge* closed at once to the "decisive range" and wasted no time at long bowls. The "decisive range" may change, but the necessity to reach it quickly remains. Second, the result was not affected by the sinking of the *Alabama*. The culminating point of the fight had been reached before that event, and even before her surrender. The like result was seen in the action between the *Alabama* and *Hatteras* on the 14th of January 1863, when the latter was beaten by superior gun-fire in thirteen minutes, but did not founder until three-quarters of an hour later. The object is victory, and whether the beaten ship sinks or not is a matter of comparative indifference to the victor. This leads up to the important conclusion that the ship need not be made absolutely unsinkable, but only sufficiently so to win victory: if she wins, she will not be sunk; if her guns are silenced, she will be sunk sooner or later unless she surrenders. May not the actions during the Russo-Japanese War be said to confirm this view?

The evidence tends to show that the policy of relying on superior gun-power to give victory was discarded, because it was believed that the effect of shell fire was so terrible that the combatants ran great risk of mutual destruction,—a doctrine not supported by war experience. The limited "decisive range" made it then impossible to spread the risk by distributing the guns on one-deckers without reducing the concentration of effect. Recourse was had to the second policy, which consisted in coating ships with impenetrable armour. Under it the offensive gun was sacrificed to the protecting armour. The primary object became safety. To defeat the enemy came to be only secondary. The "decisive range" decreased. Skill in shooting made no progress under the influence of the idea that, as the destruction of the enemy even at close ranges was difficult, to hit him at longer ranges was useless. The supremacy of the gun was impaired, and the way was prepared for the ram. How uncertain that weapon was; how at last the fallacy underlying its adoption was exposed; and how quite lately it has been discarded, is recent history.

TABLE A.

Nature of gun.	Length.		Weight.	Weight of shot or shell.		Charge.	Ranges at elevation of	
	ft.	in.	cwt.	lb.	lb.		5°	10°
32-pr.	9	6	58	Shot	32	10	1980	2880
32-pr.	8	0	42	"	32	6	1700	2580
68-pr.	10	0	95	"	68	16	1960	2880
10 inch	9	4	86	Shell	84	12	1600	2380
8-inch	9	0	65	"	51	10	1760	2660

TABLE B.

Projectile.	Charge.	Penetration in good oak.		Burst of shell.
		1200 yards.	2500 yards.	
	lb.	inches.	inches.	lb.
68-pr. shot	16	45	20	...
32 pr. "	10	30	12	...
10-inch shell	12	35	17	6 1/4
8-inch "	10	30	13	2 1/2
32-pr. "	1 1/4

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II.

THE INTRODUCTION OF ARMOUR.¹

THE fighting power of the capital ship depends primarily on her armament, and to a less degree on her protection. Her armament is the gun, the chief means of offence and the best kind of defence; her protection is armour, a passive, and therefore inferior, form of defence. We have to examine the relative military value of guns and armour, and to inquire into the relations which have been maintained between the weights allotted to each in past designs.

Three lines of thought can be traced in the designs of the first ironclads. The French mind produced *La Gloire*, British thought was embodied in the *Warrior*, while American necessities called forth the *Monitor*.

The *Gloire* design was based on that of the French 90-gun two-decker *Algeiras* with one deck removed, and the weight thus saved put into protecting armour. The armament was fifteen 16-cm. (6.4-inch) rifled guns on each side of the gun-deck behind 4½-inch armour, and three each side on the upper deck unprotected—making thirty-six in all. The weight of the armament was only 370 tons—6.6 per cent of the displacement—against 580 tons—10.5 per cent—in the *Algeiras*. The armour was imperforable by existing guns, extended from stem to stern as high as the upper deck, and covered about two-thirds of the target she presented above the designed water-line, leaving about one-third unprotected.

The designers of the *Warrior* used iron instead of wood.

¹ Read on the 12th of April 1910.

They started from first principles, without any reference to the wooden line-of-battle ship. The number of guns to be carried on one deck, and their distance apart, were the basis of the design, fixed the length of the battery, and with the addition of the necessary bow and stern determined the length of the ship. The armament on each side of the gun-deck was seventeen 68-pounders, of which only thirteen were behind $4\frac{1}{2}$ -inch armour. Unprotected on the upper deck were two 68-pounders as pivot guns—making thirty-six in all. Four 40-pounders were afterwards added on the upper deck.

The *Warrior*, as an instrument of war, was the *Mersey* lengthened, increased in size, and built of iron, to enable her to carry 1350 tons of armour and backing, and to steam about one knot faster. The weight of her armament was precisely the same as that of the *Conqueror*, a wooden two-decker of 101 guns. The armour extended from 6 feet below to 16 feet above the water-line, and for about 213 feet out of her total length of 380 feet. This meant that above 42 per cent of the total target above the designed water-line was armoured and imperforable by the guns of the day, while about 58 per cent was unprotected.

The American monitors were a special class of armoured ship designed to meet the peculiar conditions of the American Civil War, which involved working in the shoal water of the rivers and bays of the United States and fighting principally with land works. The earlier ships carried only two guns in a single turret—at first two 11-inch, then one 11-inch and one 15-inch, and finally two 15-inch smooth-bore guns. They were completely coated with armour imperforable by the guns used against them. The target they presented was very small, as their decks were only about two feet out of water. They were not sea-going ships. The *Passaic* may be taken as the typical ship.

The elements of the fighting powers of the six ships named and the distribution of the weights in these ships are given on the next page.

The relative firing capacity, or the number of rounds that can be fired per minute, is based on the results obtained when single guns are firing at short known ranges. Reduc-

ELEMENTS OF FIGHTING POWER.

	FRENCH.						BRITISH.						AMERICAN.					
	Algeiras 90.			Gloire 36.			Conqueror 101.			Mersey 40.			Warrior 40.		Passaic 2.			
	No. of guns.	Weight of shot.	Weight of shell bursters.	No. of guns.	Weight of shot.	Weight of shell bursters.	No. of guns.	Weight of shot.	Weight of shell bursters.	No. of guns.	Weight of shot.	Weight of shell bursters.	No. of guns.	Weight of shot.	Weight of shell bursters.	No. of guns.	Weight of shot.	Weight of shell bursters.
Broadside	8	lb.	lb.	...	lb.	lb.	...	lb.	lb.	...	lb.	lb.	...	lb.	lb.	...	lb.	lb.
	36	3.2	...	...	...	...	...	36	1.5	7	68	5.25	17	68	2.5	1	400	?
	18	40	?	...	...	...	...	32	1.5	7	68	5.25	17	68	2.5	1	400	?
	10	33	1	18	99	3	31	32	1.5	7	68	5.25	17	68	2.5	1	400	?
	1	99	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Relative firing capacity — i.e., number of rounds per minute	—	—	—	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	45	...	...	18	...	...	51	...	...	21	...	...	21	...	...	2	...	...
	...	60	...	?	...	...	68	...	...	21	...	...	22	...	...	12	...	...

Area of target, armoured	...	nil	...	...	...	...	nil	...	...	nil	...	...	42%	...	...	100	...	...

Crew	...	...	...	...	...	...	950	...	...	600	...	...	704	...	...	82	...	...
Displacement, tons	...	5240	...	...	5610	...	5400	...	...	5490	...	...	9120	...	...	1875	...	...

DISTRIBUTION OF WEIGHTS.

	FRENCH.				* BRITISH.							
	Algeiras.		Gloire.		Conqueror.		Mersey.		Warrior.			
	tons	%	tons	%	tons	%	tons	%	tons	%	tons	%
Hull	2450	46.8	2650	47.3	2942	54.5	2740	50.0	4720	51.8		
Armament	580	10.5	370	6.6	564	10.4	430	7.8	560	6.2		
Armour . . . . .	...	...	810	14.4	...	...	...	...	1350	14.8		
Coal	600	11.4	650	11.6	524	9.7	850	15.4	700	7.6		
Equipment, including motive mechanism or apparatus	1640	31.3	1130	20.1	1370	25.4	1470	26.8	1790	19.6		
Total	5240	...	5610	...	5400	...	5490	...	9120	...		

N.B.—The French and British figures are not directly comparable.

tions must be made when the whole broadside is firing at "decisive ranges."

The two-decked ships could fire about three times as many rounds per minute as the broadside ironclads, but the vulnerable target presented to their fire was in the case of the *Gloire* only one-fourth, and in that of the *Warrior* rather more than one-half that offered by a two-decker. Attention is called to the large proportion of unarmoured target presented by the *Warrior* (see diagrams), because this is to be found in the great majority of the sea-going armoured ships down to the present day. This point is usually forgotten by unreflecting men, who often unconsciously assume that an armoured ship is completely coated with the thickest armour she carries, although it may be a mere patch.

To determine the military value of the ships named we have to examine past naval actions.

HAMPTON ROADS.

The first sea-fight requiring attention is that which took place during the American War of Secession in Hampton Roads.

On the 8th of March 1862 the Federal force in those waters consisted of the sailing ships *Congress* of 50 guns and *Cumberland* of 24 guns, at anchor off Newport News, less than one mile from the Federal batteries, which mounted five guns. At Fortress Monroe, some seven miles away, were the sailing ship *St Lawrence* of 50 guns and the steamers *Roanoke* and *Minnesota*, each of 44 guns. The *Roanoke* was disabled with her screw-shaft broken. The speed of the *Minnesota* was about 7 knots.

In the Elizabeth River, of which the entrance was some four miles from Newport News and three miles from Fortress Monroe, was a Confederate force, composed of the *Merrimac* of 10 guns—a ship of the *Roanoke* class, cut down and converted into an ironclad,—the steamers *Beaufort* and *Raleigh*, each armed with one gun. In the James River above Newport News were the Confederate converted steamers *Patrick Henry* of 10 guns, the *Jamestown* of 2 guns, and the

Teazer of 1 gun. It will suffice to say that the Confederates destroyed the two helpless sailing ships at Newport News. The *Minnesota* under her own steam, the *St Lawrence* and *Roanoke* in tow of steam-tugs, proceeded to the assistance of the ships at Newport News, but all three grounded about a mile from the scene of action. The *Minnesota* remained on shore helpless and exposed to destruction; the other two ships were floated off and returned to Fortress Monroe without taking any effective part in the fight. After a partial action with the *Minnesota* the Confederate ships withdrew at nightfall. The *Merrimac* had lost 2 killed and 8 wounded, among the latter being her captain.

The striking feature of the day's work was not the destruction of the two helpless ships at anchor, but the fact that the *Merrimac* was proof to the then existing guns. It is conceivable that the *Cumberland* and *Congress* might have been destroyed by the original unarmoured 44-gun *Merrimac* and her five small consorts. On the other hand, as Farragut showed when he defeated the *Tennessee* in Mobile Bay, the armoured *Merrimac* might have been beaten by the five wooden frigates if they had been provided with steam power and commanded by determined men.

The loss of gun-power due to the conversion of the *Merrimac* is evident from the two armaments—

<i>Old Broadside.</i>	<i>New Broadside.</i>
2 10-inch	3 9-inch
14 9-inch	1 6.4-in. rifle
7 8-inch	2 7-inch rifle
<hr/> Total 23 guns	<hr/> Total 6 guns

During the night the iron-clad *Monitor*, armed with two 11-inch smooth-bore guns, arrived at Fortress Monroe, and on the morrow at 8.45 A.M. engaged the *Merrimac*. The action lasted until 12.15 P.M., when the latter withdrew into the Elizabeth River. The details of the fight need not be described. It is sufficient to say that each ship was impenetrable to the guns of the other, and that the action was indecisive. The *Merrimac* had 11 men wounded, while the

Monitor had 3, including her captain, who was much injured when inside the conning-tower by the explosion of a shell outside.

The failure of the gun was complete not only in perforating power at the closest ranges, but in volume and rapidity of fire. The *Monitor* was hit only twenty-one times; the number of hits received by the *Merrimac* is not known. In May 1863 five officers commanding monitors reported that "the average time required to load, point, and fire the 15-inch gun does not vary much from seven minutes." The time for the 11-inch gun was somewhat shorter. Later in the war these times were reduced one-half. On the other hand the success of the armour was great. Both sides had made themselves safe from gun attack, but their powers of offence were impaired, and the sea-going qualities of the ships had been lost. The *Monitor* foundered at sea on the 29th of December 1862.

The effect produced on men's minds by the *Monitor-Merrimac* action was most misleading. They came to think that capacity to endure pounding was more important than ability to destroy the enemy. In their thoughts the gun assumed a secondary place. The mental change from the "offensive" to the "defensive" was well shown by the substitution of the "defensive" word "ironclad" for the "offensive" terms "120-gun ship," "90-gun ship," &c., when speaking of a ship of war. The insertion of the word "armoured" against ships in the Navy List has tended in the same direction and has had a misleading effect.

FORT MACALISTER AND CHARLESTON.

The failure of the attacks on Fort Macalister and Charleston in the year 1863 exposed to view the error of these ideas. On the 21st of January, and again on 1st of February, the Federal monitor *Montauk*, aided by three gunboats and a mortar-boat, engaged during four hours Fort Macalister, a Confederate earthwork mounting seven guns. Neither side was materially injured. The Federals had no casualties, while those of the Confederates numbered 1 killed and 7 wounded. On the 3rd of March the monitors *Passaic*,

Patapasco, and *Nahant*, assisted by three mortar-boats, made a new attack lasting eight hours. The total casualties were only two men wounded. Neither side was any the worse.

On the 7th of April a Federal squadron, composed of seven monitors, the *New Ironsides* a broadside ironclad, and the *Keokuk* a ship protected by 2-inch armour, tried to pass the Confederate batteries at the entrance of Charleston Harbour. The guns which could be fired on one side by these nine ships numbered—

7	15-inch smooth-bore guns.
15	11- " " "
2	150-pr. rifled guns.
<hr/>	
Total	24
<hr/>	

The Confederate batteries engaged were armed with—

32	8-, 9-, and 10-inch smooth-bore guns.
17	6.4 and 7-inch rifled guns.
<hr/>	
Total	49 guns: besides
	18 32-pr. smooth-bore guns.
	9 10-inch mortars.
<hr/>	

The action began at 2.50 P.M. and lasted about two hours. The Federals found the channel blocked by an obstruction, which prevented them passing the batteries and detained them under the enemy's fire. The ships remained under way during the action, and the range seems to have varied between 900 and 2000 yards. At 4.30 P.M. the Admiral ordered the ships to withdraw. The Confederates fired upwards of 2200 rounds and scored about 400 hits; the Federals fired only 139 rounds and made 55 hits. On the Confederate side 3 guns were disabled and 14 men were killed and wounded, but 8 of these were injured by an explosion of ammunition not caused by the enemy's fire. The Federals had 5 guns disabled, and the *Keokuk* so badly injured that she sank the next morning. Their casualties were only 23 wounded, of whom 16 belonged to the *Keokuk* and 7 to the *Nahant*.

After this repulse it was recognised that the ships could

not hope to silence the forts. The action of the Navy became secondary to that of the Army, upon whose land batteries fell the chief task of destroying the enemy's defences. After two months' joint attack by land and sea the advanced Confederate battery—Wagner—was evacuated, and later the principal fort—Sunter—was destroyed, but Charleston was never taken by the Federals.

The failure of the attacks mentioned showed that complete armour protection may not compensate for deficient gun-power. Victory is only to be found in silencing the enemy's guns, which these monitors were unable to bring about owing to their weak offensive power.

In the official records of the war nothing is more striking than the stress laid on the defensive qualities of the monitors, as measured by the number of hits received, compared with the little attention paid to those officers who pointed out their deficient offensive power. That they were not scored by the enemy's hits struck people much more than that they failed to score hits against the enemy. The military value of the *Monitor* class was as limited as was that of the uncertain ram. The temporary success of both the monitor and the ram was due to the eclipse of the gun. At the time the real military weakness of the *Monitor* class was little acknowledged, but it was understood by the seamen who directed the naval operations, as is shown by the arrangements for the attack on Fort Fisher.

FORT FISHER.

This was a strong work, which stood on the right hand to ships entering the Cape Fear River, and was so sited that it lay within effective range of ships outside the entrance. The work had two sides—a sea face of 1300 yards, nearly parallel to the coast, looking S.E. $\frac{1}{2}$ E., and a land front of 480 yards facing N.E. On the sea front were mounted 24 guns, heavy for that date, and including 9 rifled; on the land face 20 somewhat lighter guns, including 6 rifled. The first attack, on the 24th and 25th of December 1864, failed, owing to imperfect arrangements. The second attack was

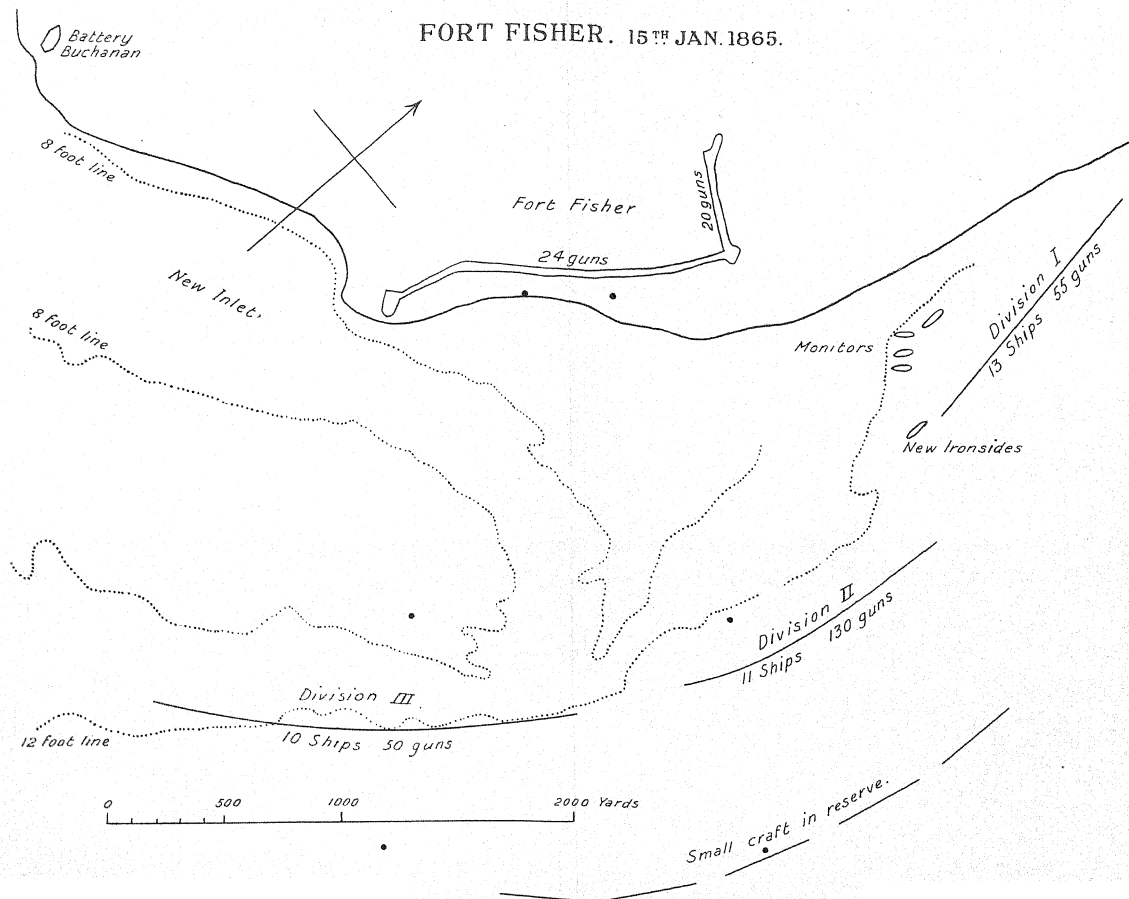
much more carefully planned, and took place on the 13th, 14th, and 15th of January 1865. The object of the Navy was to silence the fire of the Confederates by driving them from their guns into their bomb-proofs, then to disable the guns and destroy the palisades on the land front, and thus prepare the way for the assault of the Army.

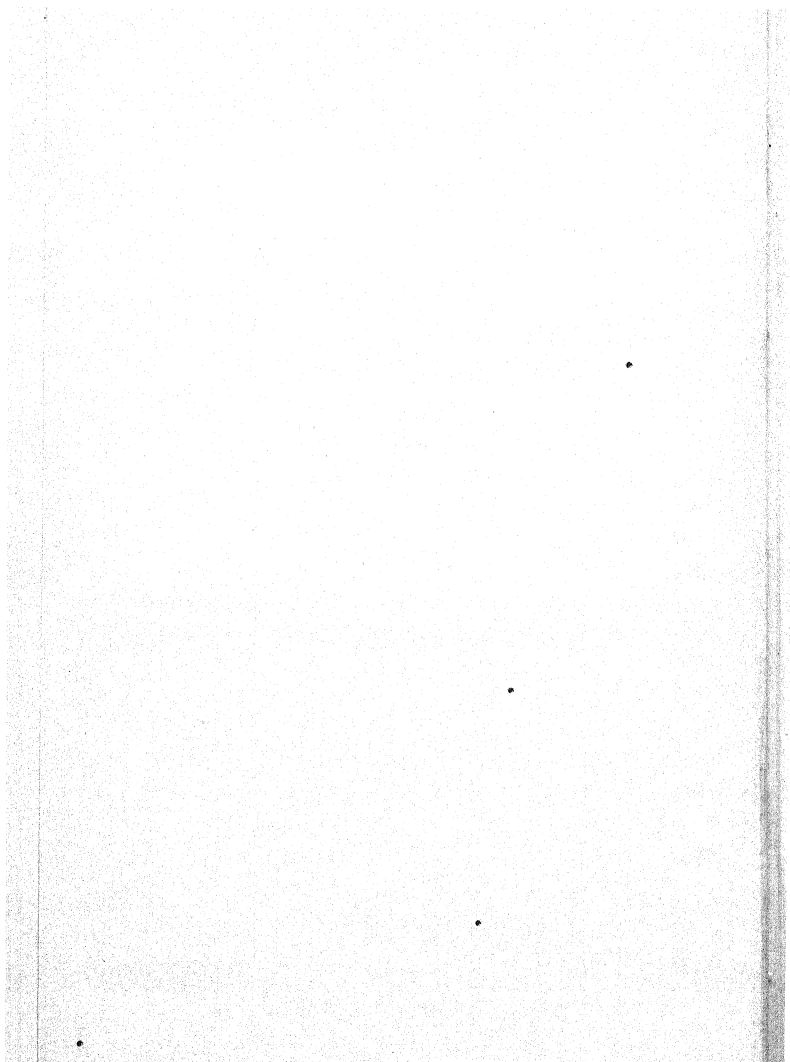
About 8 A.M. on the 13th of January the Federal Army was disembarked some five miles from the fort under cover of the Fleet. At the same time four monitors and another ironclad anchored off the eastern salient of Fort Fisher, and opened fire with 18 guns at ranges varying from 1300 to 700 yards. These ironclads were so placed that they were exposed to attack by few guns; they directed their own fire chiefly against the land front, but were unable to silence that of the enemy. About 4.30 P.M. the first division of 13 unarmoured ships anchored, and opened fire on the land front with some 55 guns at ranges varying from 2200 to about 1200 yards. A little later the second division of 11 unarmoured ships anchored in succession, and opened fire on the sea front with about 130 guns at ranges of about 1600 yards. Of the 200 Federal guns in action at this time rather less than one-fourth were rifled, but the greater number were firing at effective ranges. The 44 Confederate guns were soon completely silenced, and their men driven from the guns into the bomb-proofs. This bombardment was continued until about 6 P.M., when the unarmoured ships withdrew leaving the ironclads in position to fire at intervals during the night.

About 11 A.M. on the 14th the ironclads renewed the attack, and were supported about 2.30 P.M. by a division of unarmoured ships, consisting of one frigate to keep down the enemy's fire by rapid firing, and eight gun-vessels to dismount his guns. These ships brought about 40 additional guns into action against the land front, making 58 in all. The reply was feeble. The attack ceased at nightfall, but all these ships remained in position and fired at intervals during the night.

At 9 A.M. on the 15th a signal to renew the attack was made to the whole fleet. By about 12.30 A.M. 5 ironclads and 34 unarmoured ships were firing with about 250 guns.

FORT FISHER. 15TH JAN. 1865.





The Confederate fire was completely silenced. "Not a man could show his head in that infernal storm." On the land front only one gun remained available to repel the assault. The palisade was so damaged as to be no longer a serious obstacle. The bombardment was continued until 3.30 P.M., when the fire was diverted from the land front, the assault was made, and the place carried after about six hours' fighting: 2083 prisoners were taken out of a garrison originally numbering about 2400.

During the three days upwards of 20,000 projectiles had been fired by the Federal ships with the effect that, preparatory to the assault, the storming parties could be, and were, pushed forward to positions nearly as favourable as if siege operations had been undertaken. The casualties on board the ships only numbered 18, but the two services had upwards of 1000 officers and men killed and wounded during the assault.

The material damage to the ships was small. The iron-clads were hit repeatedly but were impenetrable. The unarmoured ships were little hit, being protected by the great superiority of their fire over that of the land batteries.

The conditions at Kinburn and Fort Fisher were remarkably similar. In each case the ironclads went into action first, but failed to silence the enemy; the unarmoured ships followed, and supplied the gun-power lacking; the losses on board the ships were trifling. The difference was that the Kinburn defences were destroyed by gun-fire, whereas Fort Fisher, being a stronger work, was only silenced, and had to be stormed.

In a letter dated the 16th of November 1854 the Emperor Napoleon III. initiated the construction of armoured floating-batteries, and assigned as a reason the great losses which ships had to fear when attacking fortifications. The experience at Kinburn and Fort Fisher shows that the reason was unsound. In the past, if ships anchored and could use effectively a greatly superior number of guns at decisive ranges, they had nothing to fear from forts. By "effectively" is meant capacity to reach the hostile guns wherever sited, and to perforate any armour protecting them.

MOBILE BAY.

The entrance into Mobile Bay lies between Dauphin Island on the west and Mobile Point on the east, and is about three miles wide. The deep-water channel leading into the bay runs about N. by E., passes close to Mobile Point, and is there not more than 2000 yards in width. On the 5th of August 1864 the Federal Admiral Farragut forced the passage through the Confederate defences, which consisted of the ironclad-ram *Tennessee*, three gunboats, and the batteries on Mobile Point. Fort Gaines, on Dauphin Island, was too distant to interfere with the passage of the ships.

The *Tennessee* was a completely armoured casemate ship, armed with six rifled guns, two of which were pivot guns and could be fired on either side or in the fore and aft line, the other four were broadside guns; her armour proved to be imperforable to the Federal guns; her draught of water was 14 feet and her speed about 6 knots.

The gunboats each carried from four to six guns, and could fire three or four of these on the broadside or one to three astern. Fort Morgan and the batteries on Mobile Point were armed with 47 guns, of which 38 bore on the channel. Abreast of Fort Morgan and across the deep-water channel was laid a triple line of mechanical mines. The eastern extremity of this line was marked by a buoy, which was about 160 yards from the shore, and about 250 yards from the Confederate battery. The channel left open was about 100 yards wide, and was much narrower than Admiral Farragut had been led to expect.

The Federal fleet consisted of four armoured monitors and of fourteen unarmoured wooden steamers. The latter were lashed together in couples, the heavier ships being on the starboard hand with their broadsides clear to use their guns when passing the batteries. Their names, displacements, and armaments were—

MONITORS.

				Tons.	Guns.
Tecumseh	.	.	.	2100	2
Manhattan	.	.	.	2100	2
Winnebago	.	.	.	2000	4
Chickasaw	.	.	.	2000	4

WOODEN STEAMERS.

	Tons.	Guns.
{ Brooklyn	3000	24
{ Octorara	1200	6
{ Hartford (Flag)	2900	21
{ Metacomet	1400	6
{ Richmond	2900	20
{ Port Royal	1200	6
{ Lackawanna	2200	8
{ Seminole	1200	8
{ Monongahela	2050	8
{ Kennebec	750	5
{ Ossipee	1900	11
{ Itasca	750	5
{ Oneida	1550	9
{ Galena	1100	10

The speed of the monitors varied from about five to seven knots, that of the wooden steamers was about eight knots. The total number of guns which the fleet could bring to bear was about 30 ahead and 75 on the broadside. Between the Federal and Confederate guns there was little to choose. Both rifled and smooth-bored guns were used. Of the former the largest were 150-pounders; of the latter, with the exception of the 15-inch guns of the *Tecumseh* and *Manhattan*, the size varied from the 11-inch of the Federals and the 10-inch of the Confederates to the 32-pounder.

With a flood-tide to carry crippled ships past the fort, and with a light breeze from the south-west to blow the smoke towards the batteries, the Federal fleet weighed at 5.30 A.M., crossed the bar at 6.10 A.M., and advanced to the attack in two columns. The monitors were placed in the starboard column to cover the port column from raking fire before and after passing the batteries, when the broadsides of the wooden ships would not bear, and could not keep down the enemy's fire. The starboard column moved a little in advance of the port column.

At 7.6 A.M. the fort opened fire on the *Brooklyn* at about 4000 yards. The fleet replied from the bow guns of the wooden ships and from the monitors, except *Tecumseh*, who reserved herself for the *Tennessee*. A military officer in the Federal fleet estimated that the Confederates had 15

guns in action during "this approach," and that their fire was quite ineffective. About 7.30 A.M. the broadsides of the leading ships were in action. At this time the Commander of the *Tecumseh* sighted the buoy marking the end of the mine-field, and thinking it impossible to go between the buoy and the shore, as ordered, passed outside it. The *Tecumseh* was blown up at 7.45 A.M. The Captain of the *Brooklyn*, also seeing a line of buoys ahead, reversed his engines and threw his ship across the channel head on to the batteries. The whole line was stopped, and a disaster was imminent. The Admiral now took the lead, 7.52 A.M., and passed over the mine-field without exploding a single mine. The ships straightened on their course. The heavy broadsides of the leading ships, delivered at short ranges of less than 500 yards, drove the enemy from his guns. The fleet passed the fort without material damage, except that received by the *Brooklyn* while she was raked, and by the *Oneida*, the last ship, who, not being protected by a superior gun-fire, suffered a good deal, and was partially disabled by a shell through her starboard boiler. It was to provide against such an eventuality that the ships were lashed together in pairs.

When the Federal fleet advanced the Confederate ships formed across the channel to the northward of the mine-field ready to rake the leading ships. After the *Hartford* passed the mines the three gunboats maintained a position at about 800 yards on her starboard bow, and punished her severely without receiving any effective reply. When the channel widened she was able to bring her broadside to bear, and to cast off the *Metacomet* (8.5 A.M., H on plan), who was sent in pursuit. The gunboats then quickly withdrew—one was captured, one was beached in a sinking condition, and one escaped.

Meanwhile the *Tennessee* had failed either to ram, or to hit, the *Hartford* with her guns. She followed that ship for some little distance, and then (8.5 A.M.) turned to ram the other advancing wooden ships, which were one mile astern. She failed to do so, but passed them at close range, fired two shots into the *Brooklyn*, fired at and missed the *Richmond*, passed the *Lackawanna*, was herself rammed by the *Monon-*

gahela, fired one shell into the *Kennebec*, two into the *Ossipee*, one into the *Oneida*, and then raked that vessel (8.20 A.M.) She had received the fire of all these ships without material injury. The Union ironclads now reached the scene and interposed between the *Tennessee* and *Oneida*.

It was 8.30 A.M., and the Federal ships began to anchor in succession some four miles from Fort Morgan. Some fifteen minutes later the *Tennessee* was seen advancing to attack them. The Federals weighed to meet her. The *Monongahela*, *Lackawanna*, and *Hartford* rammed her in succession, and together with the *Richmond* poured in their broadsides. The *Manhattan* also seems to have fired into her at this time. The ramming did not inflict any material damage. She fired her last shot into the *Hartford* when that ship rammed her about 9.35 A.M. Her fire had been silenced by the pounding she had received from guns which could not perforate her armour. The *Chickasaw* now came up and hammered away at her stern at close range. Her funnel was shot away; her steering gear was disabled; she was quite helpless. At 10 A.M. she surrendered, having lost 2 killed and 9 wounded.

The Federal losses were—

	Killed.	Wounded.
Hartford	25	28
Brooklyn	11	43
Lackawanna	4	35
Oneida	8	30
Monongahela	0	6
Metacomet	1	2
Ossipee	1	7
Richmond	0	2
Galena	0	1
Octorara	1	10
Kennebec	1	6
	<hr/> 52	<hr/> 170

The ironclads suffered no casualties.

During the first phase the *Tennessee* was in action about twenty-five minutes, but no real attempt was then made to destroy her. In the second and serious phase the action seems to have been decided in less than twenty minutes, as

she fired her last shot about 9.35, or about ten minutes after the *Monongahela* rammed her. It is true that she held out some twenty-five minutes longer, but this resistance was useless, as the fight had culminated and the decision had been reached as soon as her fire was silenced. An impenetrable, completely-armoured ship had been beaten, but only after severe fighting, which was the price paid for not having a gun to perforate the armour at any range,—a condition of things then unavoidable, but now entirely preventable.

Would the use of high explosive shell now make more or less difficult the task of silencing an impenetrable, completely-armoured ship?

The ram had been entirely ineffective, the gun had decided the action. The value of superior gun-fire was shown by the heavy losses of the *Hartford* from the raking fire of the gunboats, and by the flight of the latter as soon as the broadside of the former was directed on them; also by the small injury inflicted by the batteries, except when the protecting gun-fire was partially withdrawn, causing the *Brooklyn* and *Oneida* to suffer. The danger of fire from bursting shells was proved to have been much exaggerated. But the principal lesson was that unarmoured ships must close armoured ships to make their fire as effective as possible. The influence of the Whitehead torpedo on tactics cannot now be dealt with, but its advent is believed not to have reversed this conclusion.

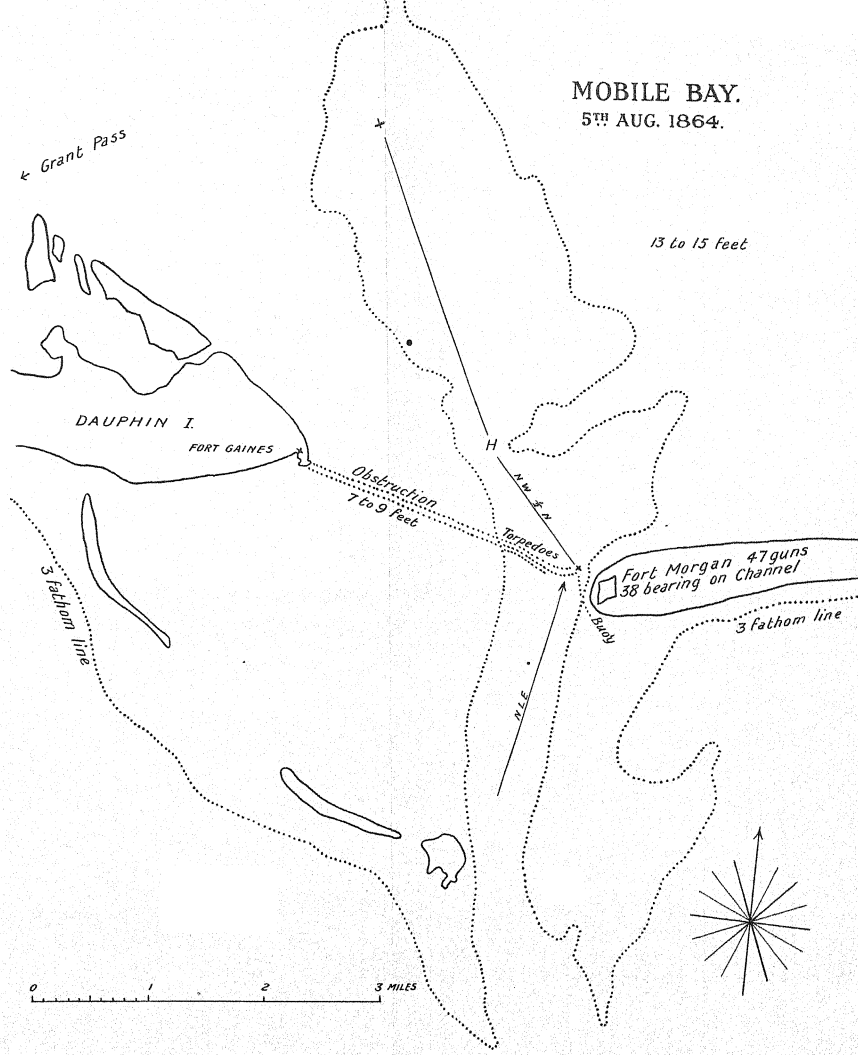
WEEHAWKEN AND ATLANTA.

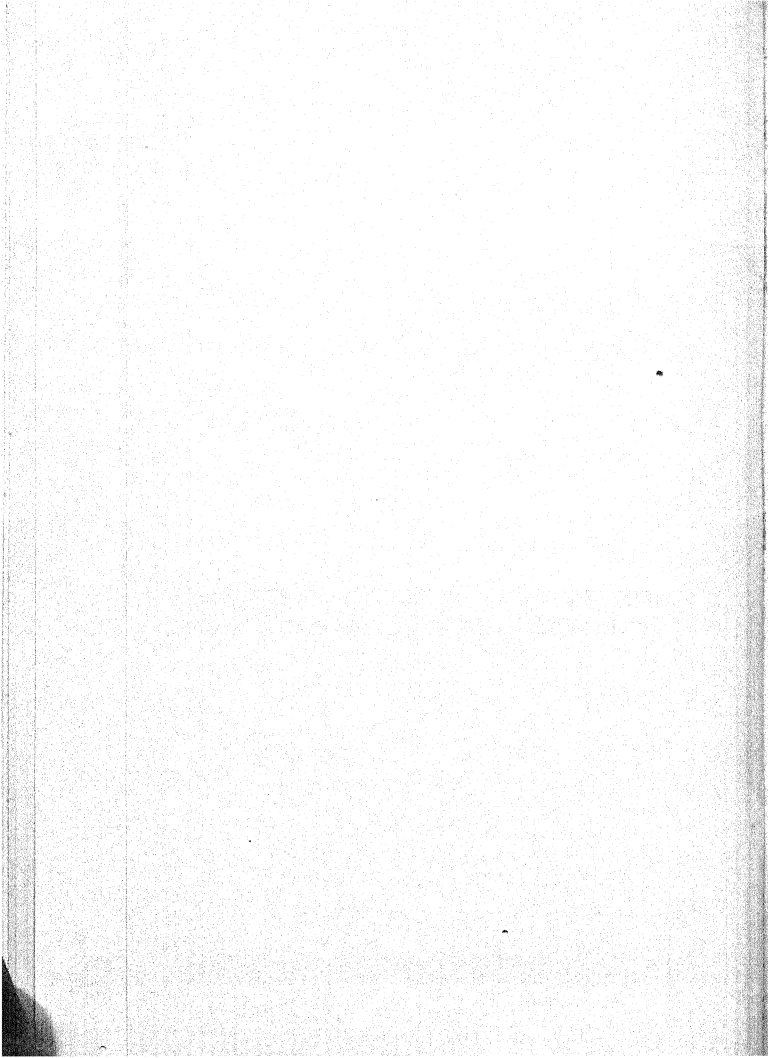
The military weakness of the completely-armoured monitor against land batteries has been made clear. The indecisive action between the *Monitor* and the *Merrimac* showed its weakness against an armoured ship. The decisive action between the Federal monitors *Weehawken* and *Nahant* and the Confederate ironclad *Atlanta* on the 17th of June 1863 was the first indication that this weakness was temporary, and would pass away as soon as the gun could perforate the armour and was properly handled.

The *Atlanta* was an iron merchant steamer cut down, fitted with an armoured casemate, and firing on one broadside

MOBILE BAY.

5TH AUG. 1864.





two 7-inch and one 6.4-inch rifled guns. The *Weehawken* and *Nahant* were single-turret monitors, each armed with one 15-inch and one 11-inch smooth-bore gun.

The *Atlanta*, coming down the Wilmington River, opened fire at 4.55 A.M. at about 3000 yards, and fired six rounds without hitting. She seems to have taken the ground shortly after opening fire. The *Weehawken*, advancing at a speed of about four knots, reserved her fire until 5.15 A.M., when the range was 300 yards. She then began and fired five rounds, making four hits, smashing in the 4-inch armour and disabling the people in the conning-tower, besides upwards of thirty men in the battery. The *Nahant* did not fire a shot. Fifteen minutes after the *Weehawken* opened fire the *Atlanta* surrendered.

To what extent did armour influence the result? Compare the action between the *Weehawken* and *Atlanta* with that between the *Kearsarge* and *Alabama*. In both cases the Federal ship closed the Confederate without firing until the "decisive range" was reached. This was 300 yards with the *Weehawken* as against 900 yards with the *Kearsarge*. In both actions the Confederate ship opened fire at long range, the *Atlanta* at 3000 yards, the *Alabama* at 2000 yards, and neither ship made a hit. The only effect of the armour was to reduce the "decisive range" from 900 yards to 300 yards. It was during the short interval occupied in closing this 600 yards that the *Weehawken's* armour might have given a real advantage; outside 900 yards she was only exposed to chance hits. As a matter of fact the *Weehawken* was not hit at all, so that armour neither contributed to her victory nor saved the *Atlanta* from defeat. As in the case of the *Keokuk* at Charleston (p. 28), and in that of the *Huascar* when she was captured in the year 1879 (p. 88), the armour of the *Atlanta* became useless directly it was perforable.

The real military case for armour can now be summed up. To win victory ships must close to "decisive ranges"—that is, to ranges at which are made hits sufficient in number and having destructive value. On its first introduction, armour, being a real protection against the shot and shell of the period, reduced the "decisive range" for the armoured ship below that for the unarmoured. An inequality,

which became important inside the unarmoured "decisive range," was introduced favourable to the armoured ship. When guns equal to perforating the armour at close range were mounted, the inequality disappeared as soon as the armoured "decisive range" was reached. The advantage to the armoured ship, while the ships closed from the unarmoured to the armoured "decisive range," was not great, since the difference between the two "decisive ranges" was small, and has tended to vanish with the introduction of more powerful guns and ships only partially armoured. As soon as this difference disappears the advantage of armour becomes questionable, especially as it absorbs weight which might be put into guns.

What was the unarmoured "decisive range"?

We have already seen that with the later smooth-bore guns this was about 800 yards. The introduction of muzzle-loading rifled guns led to some increase. Thus about the year 1870 the *Monarch* and *Hercules* each fired for five minutes at a rock 600 feet long and 60 feet high, or about four times the size of a ship, the range being 1000 yards. The former fired 12 rounds from four 12-inch guns and made 9 hits, the latter fired 17 rounds from the same number of 10-inch guns and made 10 hits.

On the 29th of May 1877 the Peruvian armoured *Huascar* of 4 guns fought with the British unarmoured *Shah* of 26 guns and *Amethyst* of 14 guns during two and a-half hours, at ranges varying from 400 to 2500 yards—chiefly between 1500 and 2000 yards. The *Shah* and *Amethyst* were not hit. The *Huascar* appears to have been struck perhaps sixty times. Twenty-one British guns had been unable to make more than twenty-four hits per hour. The true cause of this failure was inability to close to, and keep within the unarmoured "decisive range," which at this time may be taken as inside 1200 yards. The heavy-draught *Shah* could not follow the light-draught *Huascar* into shoal water. The armour of the *Huascar* would not have been proof inside the unarmoured "decisive range"—the 3½-inch part of her plating was perforated by a 9-inch common shell—and outside that range could give her only "indecision,"

and not the victory which is the true end and aim in war.

The action, in which the *Huascar* was captured by the Chilians in the year 1879, was opened by that ship at a range of 3200 yards. She did not hit until the fourth round, and then only by ricochet. The *Almirante Cochrane* returned the fire at some shorter range, and hit at the second round, when the range seems to have been about 700 yards. The results of this action, coupled with the known rudeness of the appliances and the absence of all range-finders, tend to confirm the view already expressed that inside 1200 yards was the unarmoured "decisive range" during the muzzle-loading rifled gun period.

The introduction of the breech-loader caused a further increase—e.g., the battle of the Yalu in 1894 (p. 89) indicates some distance inside 2500 yards as the range at which decisive results could be expected in favourable weather. While in the Russo-Japanese war the unarmoured "decisive range," or that which corresponds to the close action of the Nelsonian era, may be taken as somewhere inside 5000 yards.

The typical ships built during the generation succeeding the launch of the *Gloire* and *Warrior* were—

Sultan,	designed in the year 1868.	
Dreadnought,	" "	1872.
Inflexible,	" "	1874.
Collingwood,	" "	1880.
Majestic,	" "	1893.

The elements of their fighting powers and the distribution of their weights are given on the next page.

The diagrams, pp. 45, 46, have been drawn to scale to show approximately the relative size of the areas protected and unprotected by armour. The rectangles include the whole exposed vertical target above the designed water-line, including the flying deck and superstructure. The armoured parts inside the ship are not included as such, neither are the funnels or masts, nor is any allowance made for the deck area, which materially adds to the size of the target

ELEMENTS OF FIGHTING POWER.

	SULTAN 12.			DREADNOUGHT 4.			INFLEXIBLE 4.			COLLINGWOOD 10.			MAJESTIC 16.		
	No. of guns.	Weight of shot.	Weight of shell bursters.	No. of guns.	Weight of shot.	Weight of shell bursters.	No. of guns.	Weight of shot.	Weight of shell bursters.	No. of guns.	Weight of shot.	Weight of shell bursters.	No. of guns.	Weight of shot.	Weight of shell bursters.
Broadside . {	4 2 6	lb. 400 250	lb. 23.5 17	4 ... 4	lb. 800 ...	lb. 37.5 ...	4 ... 4	lb. 1700 ...	lb. 75 ...	4 3 7	lb. 714 100	lb. 31.5 7.5	4 6 10	lb. 850 100	lb. 80 7.5
Relative firing capacity — i.e., number of rounds per minute	5 2.5	of	400 lb. 250 lb.	...	2	...	...	1	...	2 7	of	714 lb. 100 lb.	5 36	of	850 lb. 100 lb.
Area of target, armoured	...	45%	...	...	41%	...	...	25%	...	...	24%	...	...	39%	...
Crew . . .	...	660	...	...	402	...	...	440	...	...	480	...	...	750	...
Displacement, tons	...	{ 8700 as designed 9300 as completed }		...	10900	...	...	11880	...	...	{ 9300 as completed }		...	14900	...

DISTRIBUTION OF WEIGHTS.

	SULTAN.		DREADNOUGHT.		INFLEXIBLE.		COLLINGWOOD.		MAJESTIC.	
	tons	%	tons	%	tons	%	tons	%	tons	%
Hull . . .	3750	43.2	3460	31.8	4310	36.0	3300	35.6	5850	39.3
Armament . . .	580	6.7	520	4.8	920	7.7	660	7.1	1580	10.6
Armour . . .	1740	20.0	3880	35.6	3400	28.3	2730	29.4	4540	30.5
Coal . . .	600	6.9	1200	11.0	1200	10.0	950	10.2	900	6.0
Equipment, including motive mechanism or apparatus	2020	23.2	1830	16.8	2150	18.0	1640	17.7	2030	13.6
Total displacement	8690	...	10,890	...	11,980	...	{ 9280 as designed 9500 as completed }		14,900	...
	N.B.—460 tons of ballast was added									

N.B.—The tables will repay close attention.

at long ranges or in a rolling ship. On each rectangle are marked in yards the ranges at which perforation of armour of the thickness shown could be reasonably expected.

If the object in battle is to move quickly to "decisive ranges," and there to bring to bear a superior gun-fire, the predominant feature about all these ships, up to and including the *Collingwood* of 1880, was their military weakness. They gave little power of defeating an enemy, because the small number of their guns limited the chance of hitting. With such weak armaments what hope was there of silencing the guns of an enemy? It is evident that the chief reliance was placed on armour and not on gun-fire. In the *Sultan* this reliance was misplaced. The 6-inch armour and below carried by that ship (see diagram) was perforable at "decisive ranges" — 1200 yards — and therefore would have lost value in decisive actions. Under such conditions 93 per cent of her side would have been perforable. Would the weight put into this 6-inch armour and below have been more effective in the form of guns? The view of the late Admiral Sir A. Cooper-Key at the time seemed to trend in that direction. In August 1866 he reported to the Admiralty that in his opinion too much importance was attached to—

The protection of men's lives in action from the effect of the enemy's fire.

The power of shells to set a ship on fire to a dangerous extent.

This was, of course, the wrong way to state the problem. The right way would have been to point out not that the protection of men's lives is unimportant, but that they are best protected by silencing the enemy's guns. The Admiral had not really thought out the question. Some glimmering of the true solution he had, since he proposed for future designs only a belt of armour at the water-line with none over the guns; while the armament was to be 12-ton and lighter guns on the gun deck, combined with two guns at each end on the upper deck. This reaffirmed the two natures of gun principle.

Sir A. Cooper-Key's proposals made no impression at the time. The problem was not thoroughly examined,

although the materials for doing so were available. The inter-relation between guns and armour was not the least understood, as was proved by the Report of Lord Dufferin's Committee on Designs in the year 1871. No one, except the late Lord Armstrong and a few other far-seeing men, seemed to realise that more powerful guns in greater numbers might have been an effective reply to armour.

The *Dreadnought* of 1872 embodied the service ideals at the time. Although her displacement was twice that of the wooden two-decker, she carried only the same weight of armament. Her rate of fire was so slow that she could only fire half-minute guns. No less than 3880 tons—35 per cent—were devoted to armoured protection, as against 520 tons—4.8 per cent—to armament, or more than 7 to 1. Her 11-inch armour would have been perforable at "decisive ranges"—1200 yards,—and would have lost value in decisive actions. Under such conditions 74 per cent of her target would have been perforable. If the object in war is to silence and defeat the enemy in the shortest time, the *Dreadnought* of 1872 must be held to have been a very weak military instrument. Would the weight put into the 11-inch armour have been more effective in the form of guns?

The resurrection of the false ideal embodied in the *Dreadnought* of 1872 is a danger to be guarded against at the present time.

The *Inflexible* of 1874 grew out of the Report of the Dufferin Committee on Designs, and reproduced the military weakness of the *Dreadnought* of 1872. The weight allotted to the armament was increased from 520 tons to 920 tons, or from 4.8 per cent to 7.7 per cent of the displacement. This additional weight was entirely devoted to increasing the size of the guns, of which the number remained the same. With only four heavy guns the rate of fire was still very slow, so that the chance of hitting the enemy and of silencing his guns was very small. For protection reliance was not placed on superior gun-fire, but on armour which absorbed nearly four times as much weight as the armament, and was concentrated to an extreme degree, leaving 75 per cent of her target unprotected.

We come to the *Collingwood* of 1880, which is the most interesting and instructive of the ships under review. In a tentative way a principle opposed to that of the *Dreadnought* of 1872 was initiated—the principle of depending on gun-fire rather than on armour. The same relative proportion of the displacement was allotted to armament—7 per cent—and to armour—29 per cent as in the *Inflexible* of 1874. A return was made to an armament consisting of two natures of guns, which increased the number on the broadside from four to seven, and enlarged the “firing capacity” from two to nine rounds per minute. Her appearance provoked a storm, which showed the mistake, first, of not assigning the proper reasons for any change in principle initiated, and secondly, of not winning over naval opinion beforehand. The *Collingwood* of 1880 was condemned by the Navy, not for lack of gun-fire, which was still her real weakness, but for want of armour, which still absorbed four times as much weight as the armament, or nearly one-third of the whole weight of the ship. The Navy, as a whole, was quite unaware that defence really depended more on gun-fire than on armour. During the long discussion which took place, hardly any attention was called to this point. The trend of opinion was shown in the reaction embodied in the *Trafalgar* of 1885, where the armoured protection was increased to 36 per cent, or to the same proportion as in the *Dreadnought* of 1872. But this was only temporary. The proportion fell to 30 per cent in the *Majestic* of 1893. On the other hand the two natures of gun principle remained, and the armament increased to 10.6 per cent of the displacement in the last-named ship—*i.e.*, to nearly the same proportion as in the wooden 2-decker. The “firing capacity” advanced to 41 rounds per minute, as against the 68 rounds per minute of the 101-gun ship. The gun was beginning to recover from the set-back it had suffered a generation earlier. Was the meaning of this fully realised? When the *Majestic* fired at the *Belleisle* in the year 1900 were the results rightly interpreted? Was it true to say that the experiment demonstrated that armour was the most efficient defence against shell-fire?

Again, we have to note that the fighting load carried by the *Majestic* was 6120 tons, or 4540 tons for armour and 1580 tons for armament—3 to 1. What is the right proportion now? If in a large fleet the weights of armour and guns were equalised without increasing the total weight, a greater number of guns could be mounted. Four wars since the year 1893 have shown that the "decisive range" has largely increased. This greater number of guns might, therefore, be brought into action on a larger number of ships.

Scale 1 inch equals 50 feet

WARRIOR 1859 ARMOUR W.I.

UNARMoured				4 1/2"	
68 pr. S.B. up to extreme ranges >				Proof in 1860	
7" M.L.	do.	>	1000	} in 1866	
9" M.L.	do.	>	2300		
Percentage		50.4		41.6	

SULTAN 1868 ARMOUR W.I.

UNARMoured		4 1/2"	6"	7 1/2"	8" 9"
7" M.L. up to extreme ranges >		1000	Proof		
9" M.L.	do.	2300	1500	Proof	
10" M.L.	do.	-----	-----	-----	Proof
Percentage		54.7	13.7	24.5	52.19

DREADNOUGHT 1872 ARMOUR W.I.

UNARMoured		11"	12 1/2"	13"	14"
12 1/2 pr. L. up to extreme ranges >		2500	500	Proof	
Smaller guns do.		Proof			
Percentage		59.3	15.1	3.6	21.9

Scale 1 inch equals 50 feet

INFLEXIBLE 1874 ARMOUR W.I. & C.

UNARMoured

20"

24" W.I.

16" C.

All guns up to extreme ranges > Proof

Percentage

75.6

12.5

11.9

COLLINGWOOD 1880 ARMOUR C.

UNARMoured

11½"

18"

12" B.L. Mark II up to extreme ranges >

Proof

6" B.L. do.

Proof

Percentage

76.5

17.7

5.7

MAJESTIC 1892 ARMOUR H.S.

UNARMoured

6"

9"

10" 14"

12" Mark VIII up to extreme ranges > 10500

5500

4000

6" Q.E.

do.

Proof

Proof

Percentage

61.

8.7

22.7

6.2 15

III.

THE CAMPAIGN OF LISSA.¹

IN the middle of the nineteenth century the struggle between Austria and Prussia for supremacy in Germany, and the desire of Italy to free Lombardy and Venetia from Austrian rule, became very pronounced. It was evident a war to decide these questions could not long be deferred. Foreseeing this event, Austria, Prussia, and Italy had for some time been preparing for an appeal to arms. Their differences came to a head in the year 1866. An Italian envoy was sent to Berlin in March of that year, and an offensive and defensive alliance between Prussia and Italy was signed on the 8th of April. After this preliminary explanation we can pass to the details of the naval situation.

Early in the year 1866 the numbers of sea-going steamships of war, omitting transports, in the Austrian and Italian navies were—

AUSTRIAN.

	Guns.	Crews.	Displacement tons.
7 armoured screw ships . .	213	2592	23,724
21 unarmoured screw ships . .	384	5005	29,204
11 unarmoured paddle ships . .	42	1005	9,231

ITALIAN.

12 armoured screw ships . .	248	4978	45,950
20 unarmoured screw ships . .	565	7394	44,777
24 unarmoured paddle ships . .	115	3318	22,136

¹ Read on the 14th of November 1910.

Neither navy was in a very efficient state. The Italian fleet had only come into existence during the previous five years. The principal ships had been built in the yards of France, England, and America, and were equal to those of other nations; but the officers and men had not been given time or opportunity to become efficient. The Austrian navy had the great advantage of some slight war experience gained during the campaign with Denmark in the year 1864; but it was backward in preparation, since it depended largely on short-service men with little training, and only seven of its ships were in commission as against twenty-one Italian. Early in April preparations to mobilise began in Austria, and probably also in Italy; but the final orders were not issued until the 30th of April by the Emperor Francis Joseph, and the 3rd of May by King Victor Emanuel. The ports of assembly were Fasana near Pola for the Austrian fleet, and Taranto for the Italian ships, but Ancona was also used by some of the latter.

On the 7th of May Admiral Count Persano was appointed to the chief command of the Italian fleet, and two days later Rear-Admiral Tegetthoff was named by Imperial decree to command the Austrian ships. The former reached Taranto on the 16th, and hoisted his flag in the armoured ship *Re d'Italia*; the latter had been at Fasana since the 9th of April with his flag in the wooden frigate *Radetzky*.

The two important dates now to be noted are the 20th of June, the day on which the Italian declaration of war was handed to the Austrian outposts, and the 20th of July, the day on which the two fleets met and fought off Lissa.

The names and displacements of the ships present at the battle of Lissa, together with their complements of men and guns, are given in the Tables I. and II. attached. Speaking generally, the Italian rifled guns were heavier, and in the case of 10-inch and 8-inch guns much heavier, than those of the Austrians. Between the smooth-bored guns in use on either side no great difference existed. The extent of the protection provided in the armoured ships cannot be given exactly, but in general terms it may be said that about two-thirds of the vertical target presented, and nearly all the guns, were protected by armour of about

4½ inches. The Italian ships *Palestro* and *Varese* were exceptions, as in them the proportion armoured was not more than about two-fifths.

In accordance with the views adopted fifty years back and since maintained, the ships have been classified in these tables as armoured or unarmoured. It is not intended to justify this division, which from a military point of view is thought to be indefensible and unsound. It did not necessarily follow either that small ships like the *Varese* and *Palestro* were "fit for the line" because they carried patches of armour on their sides, or that the 92-gun ship *Kaiser* and 50-gun ships like the *Duca di Genova* were "unfit for the line" because they had no such armour.

The Italian fleet at Lissa was superior to the Austrian in the number of men, in the number and size of the guns, and in displacement. We have to seek the reasons why the apparently superior fleet was beaten by the inferior force. The explanation will be found to lie in the difference between the minds and methods of the Admirals in command, as shown by their acts.

Teggethoff was quite clear that his aim should be to fight and defeat the Italian fleet; that to use properly the weapons available would be more important than to have, and to use improperly, those of the latest pattern; that for his purpose the ram would be a more effective weapon than the gun; and that every ship, whither armoured or not, every man, and every gun should be brought into action on the decisive day. With these objects in view he collected every available ship, and pressed on his preparations; as the ships joined him at Fasana he diligently attended to training the officers to handle their ships and the men to use their guns. He focussed the efforts of all, and evoked their enthusiasm by his order: *Ram the enemy and sink him*, which summed up his tactics. With a clear idea of what he wanted to do, one organisation in three divisions was sufficient for administration, for cruising, and for battle. The seven armoured ships formed the first division, the seven large unarmoured ships composed the second, while the nine small craft were included in the third. To each division was attached an aviso as repeating ship. The declaration of war found his

fleet organised and anchored in the three lines in which it afterwards fought at Lissa. His general instructions from the Austrian Government were that he was to act in concert with the Archduke Albert—the Commander-in-Chief of the Austrian army in Italy—but that he was not to undertake any operation likely to compromise the safety of the ships under his orders, or in which the risks would be outbalanced by the advantages to be gained.

On the other hand, Persano had no clear idea of what was required of him. He attached great importance to arming his ships with the newest Armstrong guns, and to the presence with the fleet of the most up-to-date ship, the turret ram *Affondatore*. He never understood that the defeat of the Austrian fleet should be his main object and would decide all else. He did not seem to have any definite tactical conceptions. The want of clear tactical thought carried with it a confused organisation and general uncertainty in the minds of every officer and man in the fleet. The inaction of Vice-Admiral Albini and the unarmoured ships during the battle of Lissa seems to have been largely due to the organisations and orders previously issued by Admiral Persano. These, therefore, require attention.

The so-called Italian armada, when first ordered to assemble, was divided into three squadrons, thus—

Battle Squadron.

6 ironclads, 5 gunboats or avisos, and 2 transports, under the direct orders of the Commander-in-Chief.

Auxiliary Squadron.

7 frigates, 5 corvettes, 1 aviso, 4 transports, and 2 tugs, under the command of Vice-Admiral Albini.

Blockade Squadron.

6 ironclads and 3 avisos, under the command of Rear-Admiral Vacca.

The Italian Official Staff history states that this divi-

sion was made rather to form squadrons equal in strength and composed of ships similar in type than with a view to any particular tactical action. This view accords with Persano's minute dated the 15th of June, in which he expressly states that the above organisation was an administrative, and not a tactical, division. That minute proceeds to direct that when the armada acts together it will be divided into an armoured fleet and an unarmoured fleet, each of which will be divided into groups. Also that when the armoured fleet cruises either in line ahead or in line abreast, the unarmoured fleet will form a second line to starboard, to port, or astern, at a distance which will be signalled.

The minute sets forth two organisations, one for cruising and the other for fighting. In the former the armoured ships are arranged in three groups of four ships each, while the unarmoured ships are simply told that they are to be in line ahead. In the latter the armoured ships are entirely rearranged in two groups of four ships each, with a reserve of three ships, and the *Affondatore* not in the line.

Here are three different organisations—one for administration, a second for cruising, and a third for fighting. To pass from the cruising to the fighting organisation would have required time, and would have led to much confusion in such an untrained fleet. As a matter of fact, the fighting organisation was not assumed in the coming battle. This triple organisation was quite unnecessary, and showed the confusion in the mind of Persano. If an Admiral has clear ideas on tactics, as had Tegetthoff, one organisation should suffice. The large fleets of to-day make it more than ever necessary that changes in organisation should be made as few as possible. The word "organisation" is here used in its strictly limited sense, and bears no reference to any "order" the fleet may assume. A fleet may have one "organisation," but may assume any one of several "orders."

The minute runs on: The unarmoured fleet will take station 3000 metres from the armoured fleet on the bearing signalled. In the case in which the unarmoured fleet is called upon to take part in the attack, it will, in default of special orders, form a second column indented with the armoured fleet.

The *Esploratore* and *Messagero* will take station between the two fleets to transmit orders, but will avoid entering the zone of the enemy's fire.

It will be seen that between the armoured and unarmoured fleets was no real cohesion. The mere fact that the latter was stationed 3000 metres from the former, and was not necessarily to take part in the battle, shows how little reliance was placed on the unarmoured ships, although these were manned by 5000 men and armed with 382 guns. What an immense gap does this indicate between the mind and ideals of Persano and those of Tegetthoff or Farragut! Is it surprising that Albini with the unarmoured ships looked on and took no part in the battle?

Persano deliberately placed a large portion of his force in a passive and demoralising position. This was done because the fighting power of the individual ships composing that part was considered inferior defensively to that of the strongest units of the fleet. We have before us to-day a question similar in many respects to that confronting the opposing Admirals at Lissa—the question of the employment of armoured cruisers during a fleet action. Admirals are still free to choose between the Persano and the Tegetthoff method of using squadrons of such ships. Which method is it proposed to adopt? How often in manœuvres have armoured cruiser squadrons been absent from the battle?

Again quoting from the minute: Outside 500 metres range 25-cm. (10-inch) guns only will be used against iron-clads. An armoured ship will always engage an unarmoured ship at a distance of 1000 metres, unless it is intended to use the ram.

Here we see the armoured ship directed to fight the unarmoured ship at long range for that day—1000 metres—and instructions given when certain guns are not to be used. It is evident that at the back of Persano's mind was no ardent desire, or intention, to bring all guns into action at "decisive ranges." His ideas seem to have been curiously similar to the long-range theories in vogue of late years among ourselves. Tegetthoff made short work of such doctrines. May it be that history will repeat itself.

The instructions, which concern us, issued to Persano on the 8th of June, were to clear the Adriatic of enemy ships by attacking, or blockading, them wherever they might be found, and to use the port of Ancona as his base. The Admiral does not seem to have understood his instructions, as he did not act in accord with them. If the instructions to the respective Admirals are compared, it will be seen that the situation was at first correctly judged on the Italian side by the Ministry of Marine and on that of the Austrian by the Admiral, each of whom saw that the dominant factor was the enemy's fleet.

On the 20th of June, when war was declared, Tegetthoff was at Fasana with twenty-two ships, while Persano at Taranto had seventeen ships with him besides six at Ancona.

The distances were:—

Ancona to Fasana,	76 miles.
" to Taranto,	376 "
" to Lissa,	115 "
Fasana to Lissa (San Giorgio),	150 "

The difference between the action taken by the two men is striking and instructive. Each did what was in his own head with little regard to instructions. Tegetthoff at once sent the despatch vessel *Stadium* to reconnoitre Ancona and Bari, and to get touch of the Italian fleet, which he meant to attack on the first favourable opportunity. That ship returned to Fasana on the 23rd without having seen the Italian fleet. On the next day Tegetthoff transferred his flag to the armoured ship *Ferdinand Max*, and telegraphed to the Archduke Albert asking what liberty of action he had and whether he was free to take the offensive. The reply was delayed and did not arrive until the 26th; it was to the effect that he was free to act provided he continued to watch the Venetian coast and did not pass south of Lissa. The Austrian fleet, consisting of six armoured ships, one frigate, four gunboats, and two paddle steamers, put to sea the same evening. Tegetthoff, thinking that the main Italian fleet had not yet entered the Adriatic, intended to fall on any detachment there might be at Ancona. This

was a perfectly sound policy for an inferior force, as his was believed to be.

On the 20th Persano received the telegram directing him to commence hostilities on the 23rd. He made no move until the evening of the 21st, when he left Taranto for Ancona with seventeen ships of war. Before sailing he issued a memorandum directing that during the passage the cruising order should be—the armoured ships in groups disposed astern 1200 metres apart, the unarmoured frigates in one group disposed 1800 metres on the port beam of the armoured ships. Ships 400 metres apart. The group formation was a ship on each quarter of the leader. Look-out ships were placed ahead, astern, and on either beam.

Persano made no effort to get into touch with the enemy, but learning from the *Terribile* and *Formidabile*, who joined him at sea from Ancona, that the Austrian ship *Stadium* had been reconnoitring on the Italian coast, he became uneasy and sent a despatch boat to Bari with a telegram to the Minister of Marine asking for the position of the enemy. The reply was sent promptly: "Latest information: at Fasana 5 armoured ships and as many screw frigates; Admiral Tegetthoff anxious for a bold stroke and to board; would like to surprise the fleet by night; his flag-ship would use the ram." Persano at once issued instructions to meet a night attack. These orders need not be given in detail. It will suffice to say that if they had been acted on during the night, the fleet would have been thrown into great confusion. It is evident that although the Italian fleet was in no way inferior in material strength, Persano was thinking of being attacked rather than of attacking. An Admiral who takes that line under such conditions is already half beaten. Having seen nothing of the enemy during the passage, the fleet reached Ancona on the 25th, and anchored outside the port. On arrival the fleet coaled and provisioned night and day, and some ships changed their guns for others of the latest Armstrong type. On the morning of the 27th, at dawn (4.50 A.M.), the look-out ship *Esploratore* steamed in with the signal flying that the enemy was in sight. At 5.30 A.M. the Austrian squadron was about two and a half miles from Ancona and ready for action.

Although anchored in an open roadstead not more than twelve hours from the enemy at Fasana, Persano had allowed himself to be surprised. Several of his ships were not ready. The *Re d'Italia* and *Re di Portogallo* were clearing their bunkers to put out fires spontaneously ignited in the coal; the *Ancona* had machinery defects; the *Principe di Carignano* had not finished changing her guns; the *Palestro* and *Varese* were very short of coal. Nevertheless Persano ordered steam to be raised and the ships to weigh. He left the *Re d'Italia* and went round the fleet in the despatch boat *Esploratore* to hasten matters.

The ships weighed independently as they became ready. The first ones appear to have moved between 5.30 and 6 A.M., and were directed by the Admiral to stand to the south-east in two lines close along the land, the unarmoured inshore of the armoured ships. All took station as soon as they could, and ultimately the lines were led respectively by Albini in the *Maria Adelaide* and by Vacca in the *Carignano*. Persano himself remained in the *Esploratore*, and took station abreast of the leading ships. According to the Italian official account, it was not until 7 A.M. that all ships were under way, and still later before the lines were formed. Eventually the leading Italian ships wheeled sixteen points to port, followed in succession by the others; by 8 A.M. the fleet was completely formed and was steaming towards the enemy.

The Austrian official history says that Tegetthoff waited two hours. Seeing that the enemy was standing away from him, he re-formed his squadron about 7 A.M. with a view to withdrawing, and at 7.30 A.M. proceeded for Fasana, where he arrived the same evening. The Italian fleet returned to Ancona.

Omitting the small ships on each side, Tegetthoff with seven ships had defied Persano with fifteen, and the challenge had not been accepted. The result was a great moral victory for the Austrian chief, who had now got the measure of his Italian adversary. Confidence must have been much increased on the one side and even more lowered on the other. Knowing what we do now, it seems probable that if Tegetthoff had attacked at once—as did Drake at Cadiz

in 1587 and Nelson at the Nile two centuries later—the Italian fleet might have been so seriously handled as to have been of no more use during the war. But Tegetthoff possibly did not know the real condition of the Italian fleet, and his own force, unlike the veterans of Drake and Nelson, was inexperienced.

The incident shows the imperative necessity not only of having proper look-out ships to give ample warning, but of keeping a fleet ready to engage an enemy at short notice immediately after weighing. As a matter of instruction it is well to bear this in mind when anchoring fleets even in time of peace. An admiral should get into the habit of so anchoring that the fleet can rapidly and without confusion move as an organised force ready to engage.

Persano remained at Ancona until the 8th of July, and then only put to sea under great pressure from the Italian Government. The telegrams and correspondence between the Admiral and the Minister of Marine—Depretis—are very instructive. The Italian defeat at Custozza on the 24th of June, and the intervention of the Emperor Napoleon III., had made the Italians anxious for a victory at sea. On the 5th of July the Minister telegraphed pressing this view on the Admiral, and asked when the fleet would be ready to act. The Admiral replied that, if the matter was urgent, the fleet was ready, but that two more days were required to hoist in and place guns in position. He also asked for instructions, as he had none, except those of June the 8th, which, it will be remembered, directed him to clear the Adriatic of the enemy. The Minister replied the same day ordering the Admiral to put to sea that night and outside the harbour to await the ships wanting their guns. New instructions were also promised.

The fleet did not weigh, and the Admiral wired on the 6th that the ships were ready except some guns. He added: "Please explain clearly if I ought to attack the enemy, even if covered by fortifications. I should prefer to await arrival of *Affondatore*." The Minister replied insisting that the fleet should sail, and pointing out that fortifications should not be attacked until after the Austrian fleet had been dealt with.

On the 7th arrived the new instructions, which directed that—

1. Persano was to put to sea in search of the enemy, to attack him in accordance with the orders dated 8th of June, and to push matters to a decisive result.

2. If the enemy remained in Pola, he was to be blockaded, but without exposing the Italian ships to the fire from the forts.

3. The essential Italian aim was to get the command of the Adriatic.

The Admiral replied the same day that he was satisfied with his instructions, but again suggested that he should await the arrival of the *Affondatore*.

The Minister replied: "Put to sea; leave in harbour the ships which have to embark guns; conform to your instructions."

The Italian fleet put to sea at 6 P.M. on the 8th of July, leaving some ships behind at Ancona. Persano did not seek the Austrian fleet, but wasted four days cruising midway between the coasts of Italy and Dalmatia and practising the fleet in evolutions and the crews in gun drill without firing. On the morning of the 13th the fleet again anchored off Ancona, having seen nothing and done nothing. The discontent was general. The Prime Minister—Ricasoli, General La Marmora, and the Minister of Marine—Depretis, now pressed Persano to act, but he continued to urge delay until the *Affondatore* arrived.

The Italian Government was now seriously disturbed at the inaction of the Admiral. They feared an armistice might be forced on them before the fleet could gain the victory so earnestly looked for. On the 14th of July the King presided over a Council of Ministers, at which General La Marmora was instructed to write and inform the Admiral that the Council deplored his want of energy and peremptorily ordered him to end such a negative policy; that as soon as the *Affondatore* joined he was to put to sea and begin either against the enemy's fortresses, or against his ships, such operations as he judged most proper to lead to important success; that if the fleet remained inactive the Minister would be under the hard necessity of super-

seding him in the command. The Minister of Marine—Depretis—went to Ancona on the 15th to confer with the Admiral. Although the Austrian fleet had not yet been beaten, it was decided to make an attack on the Island of Lissa. This decision was a direct reversal of the former policy, and could only be justified as a means of drawing Tegetthoff out to fight. Whatever may have been the case on the 8th of June, when the original instructions were issued, it is evident that neither the Council of Ministers, nor the Minister of Marine, nor the Admiral, understood that the dominant factor was the enemy's fleet.

In an attack of this kind time is the essence of the matter. Persano could not count on being undisturbed for much more than twenty-four hours after being sighted from the island. If the capture of Lissa was really intended careful arrangements should have been made. The cable should have been cut during the preceding night, the fleet should have been ready to attack at daylight, and an ample number of troops should have been thrown on shore without delay. Whether the attack was real or not, the most important point was that twenty-four hours after his arrival Persano should continue to hold himself ready to fight Tegetthoff. None of these things were done.

The Italian Admiral asked for a military force of at least 5000 men, but was overruled by the Minister. Six hundred marines then ready at Ancona were embarked, and with those available in the fleet made up a landing-party of about one thousand men, but these were afterwards increased by reinforcements to more than double that number. At 3 P.M. on the 16th of July, Persano, with twenty-six ships of war, left Ancona. As there were no maps of Lissa, and little was known of the island, the Chief of the Staff—d'Amico—was sent in the *Messagero* to reconnoitre. He rejoined on the following evening, having steamed round the island and noted the principal defences. The *Messagero* was observed from the island and her movements were reported.

The island of Lissa, which lies 30 miles from the Dalmatian and 70 from the Italian coast, measures eight miles from east to west and four miles from north to south. On the north side is the harbour of San Giorgio, then defended

by batteries armed with about 54 guns and mortars (see Table III.); on the west is the Bay of Comisa, then provided with two batteries armed with 10 guns; while on the south-east is Porto Manego, a very small harbour, then defended by one battery armed with 6 small guns. The garrison of the island numbered 1833 all told.

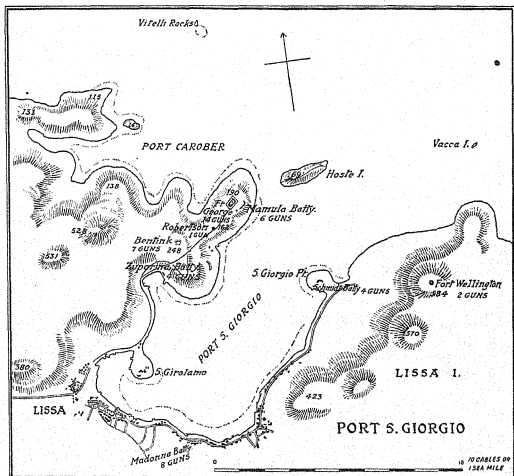
It is not necessary to describe in detail the Italian attack. It will suffice to say that the plan included a feint against Comisa by Rear-Admiral Vacca with his group of three armoured ships, a landing at Manego covered by the unarmoured ships under Vice-Admiral Albini, while the main attack was to be made by the other armoured ships on San Giorgio. The despatch boat *Esploratore* was to look-out between Planka Point and San Andrea, which are thirty miles apart; the aviso *Stella d'Italia* between San Andrea and Pellagosa. If the enemy were sighted the *Esploratore* was to steam round the island, commencing at San Giorgio, with the signal flying: "Enemy in sight." At this signal the armoured ships attacking San Giorgio were to form line in the Lissa Channel, and the unarmoured ships a second line parallel to them. The Vacca group was to be the reserve.

At daybreak on the 18th the look-out on the island reported nine ships of war twenty miles north-west. A telegram reporting this was sent off at 8.30 A.M. and reached Tegetthoff at 11 A.M. It was not until about that same hour that the Italian ships opened fire either at Comisa or at San Giorgio. Telegrams to that effect were despatched about 12.30 P.M., and probably reached Fasana about 3 P.M. Numerous telegrams reporting the progress of the attack followed during the day until the cable was cut at some time after 5 P.M.—more than twelve hours too late. The general result was: At San Giorgio (Diagram) eight armoured ships, whose united broadsides numbered 83 guns, attacked batteries armed with 38 guns (including 11 small) and 8 mortars. In the afternoon three more armoured ships joined, raising the total broadsides to 122 guns, to which were also added the 120 guns of Albini's squadron. By 5 P.M. the three outer works, George, Mamula, and Schmidt, had been silenced. Three ships, covered by the others, then attempted to enter the harbour, but were driven out by the fire from the 21 guns

mounted in Bentinck, Wellington, Zuparina, and Madonna. At sunset the attack ceased, and the Italian ships drew off out of range into the Lissa Channel. The attack on Comisa came to nothing. The attempt to land at Manego failed, and a fresh one was ordered to be made at Port Carober. The Italian loss had been:—

	Killed.	Wounded.
Re di Portogallo	4	14
Maria Pia	1	6
San Martino . . . . .	...	6
Palestro . . . . .	...	9
Varese . . . . .	...	1
Maria Adelaide	2	5
	<hr/> 7	<hr/> 41

At 10 P.M. the ships detached to cut the cable on the island of Lesina rejoined, and reported that shortly before this was done a telegram had arrived there announcing that the Austrian fleet would sail for Lissa that evening. If this were true, Tegetthoff would arrive on the morrow. In the morning a part of the fleet opened fire for a short time on the sea defences of San Giorgio, but Persano suspended the landing, and kept his main body in hand ready to meet Tegetthoff. About 10 A.M. the *Affondatore*, *Carlo Alberto*, *Principe Umberto*, *Governolo*, and a transport with 600 troops joined. In the afternoon about 4.30 the whole Italian force renewed the attack. A diversion against Comisa came to nothing. At San Giorgio there soon remained in action only 1 gun at Bentinck and 3 at Zuparina, besides those in Wellington and Madonna, which were still uninjured. The *Re d'Italia* now engaged Zuparina, while the *Formidabile* anchored and pitted her 10 guns against the 8 guns in Madonna, at a fixed range of 500 yards. Three other ships also entered the harbour, but soon withdrew. Seeing herself unsupported, and being unable to face the fire to which she was exposed, the *Formidabile* also withdrew, having suffered much. The Italian ships had been driven out by gun-fire, but the Austrians had also suffered. Out of 54 guns and mortars in the defences of San Giorgio, only 17 remained unsilenced and available for the morrow.



The garrison had lost during the two days 24 killed and 70 wounded. The Italian losses during the second day had been :—

	Killed.	Wounded.
Formidabile	3	55
Ancona	6	17
Governolo . . . . .	...	1
	<hr/>	<hr/>
	9	73

The attempt to land at Port Carober had failed. When night fell the Italian ships drew off into the Lissa Channel, except the *Terribile* and *Varese*, which remained off Busi Island. The supply of coal was now running short, and in many of the ships was limited to two days. Notwithstanding this, and the possible arrival of the Austrian fleet, orders were given to renew the attack in the morning. A diversion was to be made against Comisa, a landing effected at Port Carober, while the main attack was to be directed against San Giorgio.

During the night of the 19th-20th the wind was south-east, increased in force, and in the morning brought bad weather, with rain-squalls and drizzle, which later turned to fog over the island. Preparations were in progress to renew the attack, when about 7.50 A.M. the *Esploratore* appeared out of a rain-squall with the signal flying: "Suspicious ships W.N.W." At 5.30 A.M., being about forty miles from San Giorgio, she had sighted several steamers about two miles from her. They were part of the Austrian fleet, which had nearly passed unseen in the thick weather. The sun rose that day about 4.40 A.M.

The Italian position at 8 A.M. was: the *Terribile* and *Varese* off Comisa, some ten miles away; the unarmoured ships under Albini off Carober, with their boats out and preparing to disembark the troops; the *Formidabile* transferring her wounded to the hospital ship; the *Re di Portogallo* and *Castelfidardo*, with temporary machinery defects, unable to move; the remaining armoured ships off San Giorgio, awaiting orders to attack. It was the second time Persano had been caught unprepared. He at once signalled: "Suspicious ships are enemies. Clear for action," and to the

armoured ships: "Form single line abreast—Course W.S.W.," which later on was changed to West. It will be remembered that orders had already been given that in such a case the unarmoured division was to form a second line parallel to the armoured division. Also he negatived the landing, sent the *Esploratore* to recall the ships from Comisa, and ordered the *Governolo* and *Guiscardo* to take in tow the disabled *Re di Portogallo* and *Castelfidardo*. Albini countermanded the landing and signalled to "Hoist in boats," but it was some time before he was ready to move. At 9.30 the Austrian fleet was sighted from the Italian ships.

We must now turn to the Austrian fleet. The telegram intercepted at Lesina on the 18th was not true. Tegetthoff did not make up his mind to leave Fasana until the following morning, when he heard of the renewed attack on the island and became assured that the enemy's whole fleet was there.

The Italians were sighted from Lissa about 5 A.M. on the 18th; Tegetthoff received the news at 11 A.M. and might have sailed at 1.30 P.M. that day. He delayed twenty-four hours, and did not leave Fasana until 1.30 P.M. on the 19th; the passage took twenty-one hours, and the battle began at 10.43 A.M. on the following day. The delay in making up Tegetthoff's mind was largely due to his belief that the attack on Lissa was a feint, and to his opinion that Persano's proper objective should have been the Austrian fleet and not an unimportant island such as Lissa. He could not bring himself to believe that the attack was real. He took as long to verify the news and to make up his mind as was required to move the Austrian fleet from Fasana to Lissa. The time required to transfer force from one position to another depends on the mind and judgment of the admiral and on the arrangements for transmitting intelligence as well as on the speed of the ships. Quickness is of great moment in war, but a clear and rapid judgment is often more important than a fast ship. The latter is usually called upon to repair the blunders made by the former, as is so often seen during manœuvres. Hence much of the strategical demand for dearly-bought high speeds.

The course steered was about S.E. by S., and the passage was made at an average speed of 7 knots, but at

times the ships could not make good more than $5\frac{1}{2}$ knots against the head wind and sea. The fleet was in column of divisions in double-quarter line disposed astern—the armoured ships formed the first division under the personal command of Rear-Admiral Tegetthoff in the *Ferdinand Max*, and were in the first line; the heavy unarmoured ships formed the second division under Commodore Petz of the *Kaiser*, and were in the second; while the small craft formed the third division under Commander Eberle of the *Hum*, and were in the third. As look-out ships in advance were the *Kaiser Max*, *Prinz Eugen*, and *Stadium*. Nothing happened until 7 A.M., when the *Kaiser Max* signalled: "Six steamers in sight." But rain-squalls and thick weather soon shut out the view, giving cause for much anxiety.

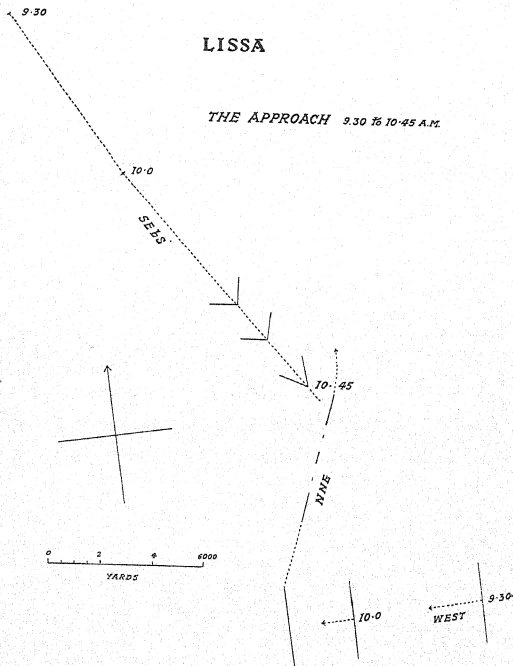
Towards 9 A.M. the wind shifted to south-west, the weather began to clear and the sea went down. About 10 A.M. the wind suddenly shifted to the north-west, the fog completely cleared away, and the Italian fleet was seen ahead some seven miles distant in two groups. The western group, composed of armoured ships, was steering west in line abreast; the eastern group, consisting of Albini's unarmoured ships appeared to be forming up, but as they did not take any part in the battle their movements need not be detailed. Soon the former turned together into single line ahead and steered N.N.E. (Diagram, p. 65).

Tegetthoff signalled: "Clear for action;" "Close up;" "Advanced ships take station;" "Full speed;" and at 10.35 A.M., "Armoured ships charge the enemy and sink him." About 10.43 A.M. the Italian van passed about eight cables ahead of the *Ferdinand Max* and opened fire. The Austrians did not reply until the range was reduced, when the port wing ship, the *Kaiser Max*, began, and the firing soon became general.

The diagrams show the opening phases of the fight. The Austrians are seen in the order already described steering S.E. by S. at a speed of about 8 knots. The Italians appear in single line ahead steering N.N.E. at about the same speed, and in three groups each of three ships—the van under Rear-Admiral Vacca in the *P. di Carignano*, the centre under Captain Faa di Bruno of the *Re d'Italia*, and

LISSA

THE APPROACH 9.30 TO 10.45 A.M.



the rear under Captain Riboty of the *Re di Portogallo*. The *Formidabile* went off to Ancona, the *Varese* came up into station just in time, and the *Terribile* joined Albini's squadron, with which she remained an idle spectator of the battle. The *Affondatore* was not in the line, but to starboard of it. The gap between the van and centre was caused by the *Re d'Italia* stopping about 10.15 to transfer Persano to that ship, on which a Vice-Admiral's flag was hoisted, without being observed by the fleet. It was not until after the battle had been decided that it became known the Commander-in-Chief had changed his flag-ship. At the supreme moment the true character of the Admiral appeared. His want of self-confidence became greater than his indecision. He took refuge behind the supposed virtues of the latest pattern ship, and in so doing abdicated his position and threw the fleet into confusion.

As the Austrian van passed through the gap between the Italian van and centre, Tegetthoff ordered the first, or armoured, division to form single line ahead on the *Ferdinand Max*; he then turned to port and stood back to attack the Italian centre group. (See Diagrams.) At the same time Commodore Petz made a similar signal to the second or wooden division, and the *Kaiser* bore away to starboard. In each division the wings closed in and the ships formed without regard to the regular order.

The Italian group leaders each bore away towards the north. The van, edging away to north-west and west, passed round the rear of the Austrian fleet. The centre became engaged in a *mêlée* with the Austrian armoured division. In the diagrams the *Re d'Italia* is shown passing astern of the Austrian van, but according to Lieutenant Fleischer of the Austrian Navy she passed between the *Ferdinand Max* and her next to starboard, and thus broke through, as afterwards did the *Hi Yei* at the Yalu. The rear, after meeting Petz and his wooden ships, joined the centre in the *mêlée*. The *Affondatore* also stood to the north and passed through a gap in the Italian line. Soon after the opening of the battle the view became obscured by thick clouds of smoke. The wooden two-decker *Kaiser* stood

steadily on at the head of the second and third divisions in irregular order, and met the *Affondatore*, with whom she exchanged broadsides. She was hit once by a 300-pounder projectile, which disabled six men, dismounted a gun, and did other small damage. The *Affondatore* also received some injury and passed on.

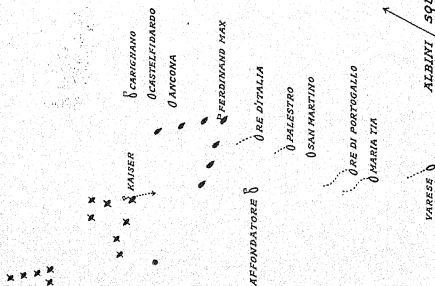
The next enemy to appear in the *Kaiser's* path was the *Re di Portogallo*; that ship she deliberately rammed abreast the engine-room on the port side. This was at 11 A.M., or seventeen minutes after the first shot was fired. The blow was delivered at an acute angle. As the ships ground past each other the Italian lost anchors, boats, port-lids, and sixty feet of her armour was displaced, but she fired her whole broadside of fourteen guns into the Austrian at close range. The *Kaiser* lost her bowsprit and foremast, the latter with its rigging falling across the funnel, and being set on fire by the sparks therefrom. After the ships separated she continued to fire at the *Re di Portogallo* until that ship was out of range, and then she began to engage the *Maria Pia*, who fired two shells into her, inflicting further damage. With the ship on fire, with a damaged funnel and the speed much reduced in consequence owing to the difficulty in keeping steam, and with many casualties among the officers and men, the *Kaiser* drew out of action, followed by most of the large wooden ships and some gunboats. Presently she was again attacked by the *Affondatore*, who made three ineffectual attempts to ram, and was finally driven off with several shot-holes through her deck, and on fire below, caused by shot and shell from the *Kaiser* and from other ships in company. The disabled two-decker, with one gunboat in company, now made for the harbour of San Giorgio, where she anchored at 1.30, with springs on her cable and ready to defend herself. In twenty-four hours she was again ready for action. She had been more severely engaged than any other ship present. She had fired 850 rounds—thrice as many as any other Austrian ship, and had been hit eighty times, or nearly twice as often. Her casualties had been 24 killed, 37 severely and 38 slightly wounded—a loss much smaller

than that of the *Bellerophon* at the Nile or of the *Impregnable* at Algiers. Her crew were not beaten, although they were short-service men and had been only three months together.

It is now necessary to return to the *mêlée* (see Diagram), in which were engaged the six ships of the Italian centre and rear with the seven ships of the Austrian armoured divisions. The movements need not be described in detail, as they followed no particular principle. It is sufficient to say that the ships steamed about in the smoke firing indiscriminately and occasionally colliding with each other. Tegetthoff especially sought an enemy to ram. Soon after the action began, the *Ferdinand Max*—his flagship—ran obliquely into two Italian ships in succession without seriously injuring either: the first was either the *San Martino* or the *Re d'Italia*, the second was the *Palestro*. The *San Martino* was twice set on fire by shells, and the *Palestro* once; the former put out the fire on each occasion, the latter could not do so, and blew up at 2.30 P.M. Either by gun-fire, or as the result of collision, the *Re d'Italia's* steering-gear was so disabled that she could not manœuvre. While in this helpless state and nearly motionless she was rammed and sunk by the Austrian flagship *Ferdinand Max*. This was about 11.20, or thirty-seven minutes after the action began. Some time after this the *Ancona* and *Varese* collided, and later on the *Maria Pia* and *San Martino* ran into each other. Except that the last-named ship wrenched her ram and sprang a leak, no particular damage was done in either case. Presently the ships on either side began to draw apart. Rear-Admiral Vacca made the signal: "Form single line ahead without regard to the regular order," and at 12.10 Tegetthoff made the general recall or signal to "assemble." The action had lasted somewhat less than an hour and a half.

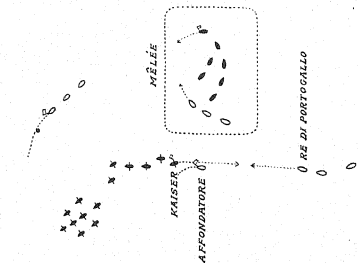
The two fleets formed up parallel to each other and stood to the N.E., the Austrians in three lines to the eastward and covering Lissa, the Italians in two lines to the westward, the armoured ships in each fleet forming the line nearest the enemy. Tegetthoff had gained his object and did not wish to renew the battle. Persano had

LISSA 10-50 A.M.



ALBANI SQUADRON

LISSA 10-55 A.M. and after



0 10 20
CABLES

Austrian Armoured Ships
+
Wooden
-
Italian Armoured " 0

been defeated and had completely lost the confidence of the Italians, who had no heart for further fighting. The latter gradually withdrew and eventually anchored at Ancona, while the Austrians went into Lissa for twenty-four hours and then returned to Fasana, where they anchored on the 22nd, having been absent three days.

The Italians had lost the *Re d'Italia* and the *Palestro*, the first destroyed by the ram, the second by the gun. In addition to the 381 drowned in the former and the 231 blown up in the latter, the casualties appear to have been:—

	Killed.	Wounded.
Re di Portogallo	3	11
San Martino	3	4
Maria Pia	1	19
All other ships	1	6
	<hr/>	<hr/>
Total	8	40

Except in the two ships destroyed, the losses incurred by individual ships had been very small. The number of hits received by the Italian ships is not known. Besides the *Palestro* three ships had been on fire, but the flames had soon been extinguished, except in one case where some time had been required to do this. The ram of one ship had been wrenched in collision. Beyond these cases the material injuries had not been great. It was moral, and not material, damage which prevented the Italians renewing the action.

The Austrian casualties are given in Table IV. They had been very small, except in the case of the two-decker *Kaiser*, who, as already mentioned, had been more closely and more hotly engaged than any other ship. The *Schwartzenburg* and *Friedrich* had been hit below the water-line, but the leaks had been kept under by the pumps; the *Adria* had been badly on fire; beyond these the material injuries had been small. Table IV. gives the "hits received," which include all, whether on hull, masts, or rigging, and are small in number when compared with the 230 hits on the hull said to have been received by the *Impregnable* at Algiers half a century earlier. That they must be largely discounted will be seen by examining in detail those on the *Ferdinand Max*.

The hits on the *Ferdinand Max* were:—

	Port Side.	Starboard Side.
Masts, yards, and rigging	5	...
Funnel	4	...
Ventilators, boats, anchors, and topsides	13	12
Armour, below water-line . . . . .	...	1
" just above "	1	...
" in wake of guns	2	1
" before or abaft guns	1	2
	26	16
	42	

Unfortunately the details are wanting as to the other ships.

It will be noted that the armour kept out eight projectiles, of which five probably had some importance. The three in the wake of the guns might have produced casualties among the gun's crews; the two near the water-line might have caused leaks probably somewhat similar to those kept under by the pumps in the *Schwartzenburg* and *Friedrich*.

The comparatively large number of casualties—99—in the *Kaiser* seems to have been due as much to the large number of hits she received and to the wrong tactical use made of her as to the absence of armour. The small loss—77—in all other ships was due more to the small number of hits than to the presence of armour. Why was the number of hits small?

The tactics adopted were unfavourable to the use of the gun. To hit with the gun opportunity must be given to use it. The range must be kept short enough, and together with the bearing of the enemy, constant enough, for a time sufficient to make the hits required. This means that the ships' heads must be laid in the same direction. This was not done at Lissa. The ships charged past each other, so that, except in the case of the *Kaiser-Re di Portogallo* incident, the opportunities given to use the gun effectively were very short. Tegetthoff elected to depend on the ram, and adopted an "order" and a tactics suitable to it. Although warned beforehand of the Austrian intention to use the ram, Persano was not prepared with a tactic to meet it. On what weapon did he intend to depend? The use of the ram involved keeping end-on to the enemy or

crossing him; dependence on the gun meant holding the enemy nearly abeam and steering in the same direction. The action between the *Weehawken* and *Atlanta* in the year 1863, and that between the *Kearsarge* and *Alabama* in the year 1864, had shown that guns could not be used effectively when ships approach end-on and the range is rapidly changing. To receive in line the Austrian end-on attack was to ensure that the Italian guns would not be effective. This was the true objection to it, and not that usually given—viz., that the Italians were exposed to being rammed. On the contrary, the line ahead was a favourable order in which to meet the ram attack, as the ships covered each other. Twenty-eight years later the battle of the Yalu (p. 89) was fought on precisely the same lines, and the Japanese then showed the possibilities of the line ahead against the double-quarter line or line abreast.

The reader may perhaps agree that the gun was used improperly at Lissa. The battle did not prove that it was an ineffective weapon. The attack on the forts of San Giorgio, and the repulse of the *Formidabile* by the battery Madonna, showed, on the contrary, that it could be very effective when given proper opportunity. Experience both before and since has confirmed this.

How did the ram come out of the battle? Its success in the case of the *Re d'Italia* struck the popular and professional imagination. No sufficient inquiry was made into the attendant circumstances. It was not noted that the *Re d'Italia* was not under command, which made the conditions exceptionally favourable, nor that the *Ferdinand Max* had previously made too unsuccessful attempts. It was not remarked that twice Italian ships had rammed each other, thus repeating the incident at Mobile Bay when the *Hartford*—Farragut's flagship—was nearly sunk by the *Lackawanna*, one of his own ships. Not until many years afterwards was the value of the ram as a weapon thoroughly examined. It was then proved to be entirely unreliable, and as dangerous to the one side as to the other when both are under way and under command. The conclusion drawn from the battle that the ram was a reliable weapon and superior to the gun was entirely wrong, misled pro-

fessional thought for a generation, and seriously influenced the designs of ships of war.

But the relative value of the gun and the ram, although very important, is not the chief conclusion to be drawn from the campaign of Lissa. The difference between the personalities of the two Admirals influenced the result much more than any difference between the weapons. The indecision of Persano was the chief cause of his defeat. To what was it due? Why did he attach so much importance to the *Affondatore* and to the new Armstrong guns? No doubt his indecision was to some extent inherent in his nature, but it is believed to have been much more due to ignorance arising from not having studied his profession. His craving for the latest thing in ships and guns may be traced to the last-named cause. Suddenly brought face to face with war problems which he had not considered, he did not know what to do, and lost all confidence in himself. A man who has not pondered over the acts of the great leaders in wars of the past almost inevitably assumes the mental attitude of the bad workman who complains of his tools. He naturally asks for better ships and weapons, and relies on large ships, on thick armour, and on big guns. All these Persano had in preponderance on the day of battle, but they did not save him from defeat. The only safe check on such peace pedantry as his is to examine past war practice. It is only by study and reflection that an officer can come to know that victory does not depend mainly on such things, but on the courage, the will, and the intellect of the admiral, and on the spirit with which he inspires the officers and men of the fleet.

If this is accepted as true, then the war value of a navy is measured by the capacity of the admirals who control it, and by the spirit which animates the captains, officers, and men rather than by size or special characteristics of the ships.

IV.

FROM LISSA TO THE YALU.¹

THE battle of Lissa offers a striking example of the truth of the axiom that the weapon governs tactics. The choice of the ram by Tegetthoff, as the weapon on which to rely, forced him to keep end-on to the enemy and to fire at a range which was rapidly changing. Reliance on the gun would have entailed keeping the enemy broadside-on and the range nearly constant. The report of the Committee on the designs of ships of war in the year 1871 shows that the weapon also governs design.

In addition to the Chairman that Committee was composed of—

- 4 men of Science.
- 2 Civil Engineers.
- 1 Shipbuilder.
- 1 Marine Engineer.
- 1 Royal Engineer.
- 6 Admirals and Captains of the Royal Navy.

The terms of reference directed inquiry to be made into the comparative safety of the *Captain* and *Monarch*, the former having capsized and been lost at sea during the previous year. The Committee was further instructed to advise the Admiralty whether,

With reference to the present state of the science of naval architecture and the requirements of naval warfare, the principles which should regulate the form and type of warships to be built for the

¹ Read on the 15th of November 1910.

service of this country are fully satisfied by the designs (of certain specified ships) with the improvements recommended in them, or whether any further modifications are desirable.

The stability and safety of the *Captain* were problems for the naval architect and, in a less degree, for the seaman. The principles which should regulate the design of a ship of war were, and are, in the first place military. To expect the same Committee to deal with these two widely different questions proved to be a mistake. Both in the constitution of the Committee and in the terms of reference the science of naval architecture was given more weight than the requirements of war. The report follows the lead thus given, and shows no insight into the military principles involved in the design of a warship. The greatest height to which the Committee could rise is to be found in the following passage:—

A simple and perhaps, under ordinary circumstances, a safe method by which the requirements of the British Navy may from time to time be estimated, is to watch carefully the progress of other nations in designing and constructing ships of war, and to take care that our own fleet shall be more than equal both in the number and power of its ships to that actually at the disposal of any other nation.

Such advice is of little value without a true conception of what constitutes power in a warship. The Committee made no adequate attempt to inquire into this or to establish the military principles which govern it. Without that inquiry their counsel was as likely as not to lead in the wrong direction, and indeed actually did so. The useless coast-defence ships under construction at that time show that it is a mistake to depend upon other countries for inspiration. Have any such military principles yet been thought out and clearly set forth? Without them, is the advice to build each individual ship more than equal in power to those of other nations any more likely to lead in the right direction now than it was then? Even if the advice was right then, is it based on sound military principles now?

Although not explicitly stated, the Committee accepted

the ram as the primary weapon without any inquiry into its capabilities. As a necessary consequence they favoured the end-on attack coupled with right-ahead fire. The following extracts from the report show this:—

The importance of ramming in future naval warfare is likely to be so great, that in designing armour-clad ships particular attention should, and we doubt not will, be paid to the best means of resisting it. If the cellular or raft system of construction, to which we have alluded in a former paragraph, should prove in other respects feasible, one, and that by no means the least, of its advantages will be found in the protection it will afford against the dangerous consequences of this mode of attack.

No indication is here given of any attempt to inquire into the possibilities of the ram as a weapon, but only into the best way of constructing the ship to resist it. The Committee were thinking, not of victory, but of safety.

Another passage reads: "Looking to the fact that the bow attack is generally considered to be that which will probably be adopted in future actions. . . ."

Again, the Committee recommended a class of armoured ship with one armoured turret carrying two guns and supplemented by a number of lighter guns unprotected by armour. In this ship they "considered it essential that the power should exist of obtaining a direct bow fire in a line with the keel from the turret guns."

The *Hero*, *Conqueror*, *Victoria*, and *Sanspareil*, built in the ninth decade of the last century, were of this class. These ships were designed under the influence of the ideas that the ram was a reliable weapon, and that the gun could be used end-on with effect. A careful examination of the actions fought during the American Civil War of 1861-65 and of the battle of Lissa in the year 1866, would have thrown doubts on the value of the ram against steam-ships under way with full command of speed and with steering-gear unimpaired. A critical examination would have shown, as the late Rear-Admiral H. J. May proved in the year 1897, that "with the highest skill and the best possible ship ramming must always be a most hazardous undertaking"; that the margin between success and disaster is extremely narrow;

that with an alert and handy antagonist it is a mere matter of chance which ship rams the other. The true plea for the disappearance of the ram is its inherent imperfection as a weapon rather than the increased range and accuracy of the modern gun.

Again, war experience has always shown that the gun can only be used with effect when the range and bearing are kept fairly constant. In the sailing era no decision resulted when fleets passed each other in opposite directions. As Lissa showed the introduction of steam did not change this. When ships approached end-on the gun-fire was quite ineffective, as was proved by the action between the *Weehawken* and *Atlanta* in the year 1863, by that between the *Alabama* and *Kearsarge*, and by Farragut's approach at Mobile in the following year. With the rude appliances of those days it is not surprising that the guns could not hit under the conditions of a rapidly changing range. But it is hard to understand why such simple facts were not recognised, and why it was not seen that end-on fire could only be used with effect in chase or in retreat. The result of not inquiring into the capabilities of the weapons and the methods of using them was that the four ships named were designed on unsound military principles. To destroy the enemy they had to depend upon one unreliable weapon—the ram—and upon another—the gun—used in the most ineffective way. With existing appliances, whatever the future may have in store, is end-on fire when ships are running in to “decisive ranges” any more likely to be effective now than it was then?

But a more important military question with which the Committee had to deal was the inter-relation between guns and armour, to which attention has been already drawn in a previous paper, but to which reference must again be made. At that date there was no doubt that armour 24 inches thick would be required to resist the guns that could be constructed. It was thought to be certain that no first-class sea-going ship of manageable size could be made to carry complete armour protection of anything like that thickness, and no one was sure that even that would remain imperforable. On the plea that the use of protecting armour reduced the offensive power or armament the late Lord Armstrong recommended the

reduction of armour to a minimum, or even its total abandonment, as a protection to the guns. The Committee were unable to arrive at the same conclusion, and added that—

After making every allowance for the disadvantages that attend an enormous deadweight of very costly armour, which after all is not absolutely impenetrable to certain special guns, we cannot lose sight of the indisputable fact that in an action between an armour-clad and an unarmoured ship (assuming that they carry guns of equal power), the former has, and must have, an immense advantage in being able to penetrate the sides of her adversary at a distance at which she herself is impenetrable ; and, further, on being able to use with effect those most destructive projectiles, common shells, which would fall harmless from her own armoured sides.

These arguments show inability to understand the facts. They assume that an unarmoured ship cannot face an armour-clad if both carry guns of equal power. But the armour and armament together form the total fighting load, and therefore if one is reduced the other should be increased in the same proportion. Again, capital ships are intended to act together in fleets, and to consider them singly is misleading. Hence, the comparison should be between a fleet of unarmoured ships of superior gun power, and possibly higher speed, and a fleet of armour-clads. But this is not all. The assumption that the armour-clad will be impenetrable at distances at which she can perforate the sides of her adversary misrepresents the war conditions. It ignores the facts that at least half the target presented by the sea-going armour-clad is entirely unprotected by armour ; that in order to hit their enemies ships must close to "decisive ranges," at which much of the armour is perforable and loses much value ; and that the difference between the "armoured and unarmoured decisive ranges" is small and often vanishes. Lastly, it sets forth the doctrine that the armoured ship should play for safety by remaining at long range—a doctrine diametrically opposed to the teaching of Nelson.

Again, the Committee were of opinion that "the first ranks of our ships of war should continue to carry armour of as great resisting power as possible." Recognising the difficulty of covering a large area with very thick armour, they suggested

"a very strongly plated central citadel, surrounded and supported by an unarmoured raft constructed on a cellular system. . . ." This idea was based on the doctrine of the "single blow," and was afterwards embodied in the *Inflexible* of 1874 and in four other ships. The doctrine of the "single blow" maintained that the single knock-out blow would be decisive in battle. These ships were, therefore, armed with a very small number of the heaviest guns, and the armour was made as thick as possible and concentrated to protect the guns, magazines, and motive power, and to guarantee some flotation and stability.

Tegetthoff's success in sinking the *Re d'Italia* gave birth to the doctrine, which, originating with the ram, has been applied to other weapons and is behind much of the favour given to the big gun and Whitehead torpedo. The influence of the doctrine on design has been so far-reaching that we shall again return to it.

Finally, it is a curious and instructive fact that the report contains only a slight reference to destroying, or disarming, the enemy, and no proposal to increase the gun power. The minds of the Committee were almost entirely centred on *safety*, which with them was identified with thick armour. They thought chiefly of how the enemy could hurt them, and not of what they could do to the enemy. They advocated not more guns, but thicker armour, for the *Devastation* class. They found fault with the *Monarch* not because her guns were few in number, but because her armour was only seven inches thick. They recommended coast-defence ships of the *Cyclops* class, but faster, the increased speed being obtained by sacrificing two out of the four guns. They proposed that the guns of the large unarmoured cruisers should be carried on the upper deck instead of on the main deck, not because their fire would there be more effective, but because the enemy's fire would be less destructive. Towards the end of the report was introduced a saving clause, which shows the truth struggling to get itself recognised. In this it was pointed out that the penetration of armour-plates is not the only work required from the guns of a ship of war; that a composite armament of protected and unprotected guns would in some cases be desirable and

highly advantageous; and that occasions may arise when a rapid and well-sustained fire may be of more importance than perforating power.

The idea that safety is of paramount importance, and that the defeat of the enemy is only secondary, is not only directly opposed to military principles, but is calculated to undermine and destroy the military spirit. True safety is to be found only in disarming and defeating the enemy; but this was not sufficiently emphasised by the Committee in their report, and is not always remembered to be a fundamental principle even in the present day.

The idea of destroying an enemy with one blow is immensely impressive, until we realise the difficulty of planting the blow in the right place in a limited time. The enemy may beat you before the knock-out blow can be given him. In the end-on attack the difficulty of using the ram was so great that the doctrine of the "single blow" was untenable. Under the same circumstances the opportunity to use the gun was so short, and the chance of hitting was so small, that the only hope of producing any real effect was to make the blow as heavy as possible—*e.g.*, the 110-ton guns of the *Victoria* and *Sanspareil*. Lack of tactical skill in using the gun was to be made good by increasing its weight.

What had war experience shown to be the chances of delivering a vital blow in a limited time? At Lissa 176 guns in the Austrian ironclads fired 1386 rounds, or about 7.8 rounds per gun. The number of rounds fired by the Italians is not known, but, assuming the same rate of fire, the 243 guns in their ironclads would have fired 1895 rounds. As the Italian wooden ships were never seriously engaged, it is not unreasonable to assume that the 412 hits received by the Austrian fleet were made by the Italian ironclads alone. This would give about 22 per cent of hits to rounds fired. But in the *Ferdinand Max* only two hits were near the water-line out of the forty-two received. If that proportion held in other ships, not more than about 1 per cent of the rounds fired could have been vital. Again, the Austrian wooden ships received 190 hits, but only two—about 1

per cent—caused serious injuries near the water-line. The ships in question were the *Friedrich* and the *Schwartzenburg*. In this battle probably not more than 1 per cent of the rounds fired, or 5 per cent of the hits made, struck near the water-line. But such hits have never been all necessarily vital, and therefore these figures must be discounted to get the percentage of vital blows.

Very soon after Lissa provision against the single blow began to be made. The main engines were duplicated, alternative steering-gear was provided, and the hull was subdivided. By the year 1885 the only really vital points in ships of recent construction were the magazines, boilers, and perhaps the confined gun positions, which were themselves the product of the "single blow" idea. Was it reasonable to assume as probable that a ship armed with only four large guns, and equal to firing in all not more than one or two rounds a minute, would be able to deliver a knock-out blow on a vital spot before the fight was otherwise decided? It would seem not to be so. Whatever truth there may have been in the doctrine of the "single blow" during the 'Sixties and 'Seventies of the last century, by the later 'Eighties the doctrine had become nearly as untenable in the case of the gun as in that of the ram. Not only was the blow of the former less effective than that of the latter, but the difficulty of delivering it was nearly as great. The doctrine did not rest on war experience, and must have been a false deduction from practice-ground experiment.

What has war experience later than Lissa to say on these matters? The Chili-Peruvian war of 1879 is instructive on some points.

POINT ANGAMOS.

On the 8th of October 1879 the Peruvian single-turret ship *Huascar* was defeated, and captured, off Point Angamos by the Chilian central battery ships *Almirante Cochrane* and *Blanco Encalada*.

The *Huascar* was of 2030 tons displacement, and could steam about 11 knots. Her side armour was $4\frac{1}{2}$ inches

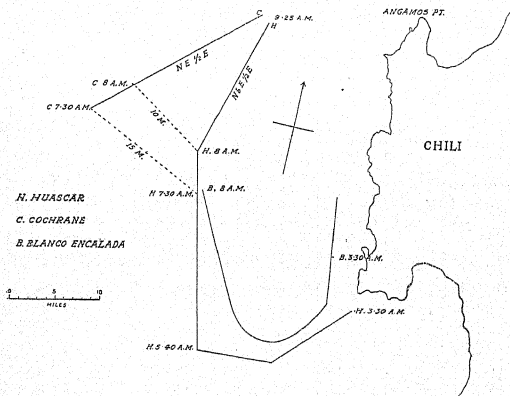
abreast the turret, engines, and boilers, and tapered to 2 inches at the bow and stern; that on the turret was 5½ inches, with an addition of 2 inches round the ports. Two 10-inch (300-pounder) 12½-ton guns were mounted in the turret, and could be fired from 10 degrees on either bow to 32 degrees on either quarter; one 40-pounder was placed in the stern, another on the starboard side of the quarter-deck, but on the port side was only a 12-pounder.

The *Almirante Cochrane* and *Blanco Encalada* were sister ships of 3500 tons displacement. During the action the speed of the former was about 11 knots; but the latter could not make more than 9 to 10 knots owing to a foul bottom. The armour on their belts was 9 and 6 inches amidships, tapering to 4½ inches at the bow and stern; that on the battery was 8, 6, and 4½ inches. Six 9-inch (250-pounder) 12-ton guns were mounted in the battery, three on each side; the foremost one could be fired from right ahead to 3 degrees abaft the beam, the centre guns from 70 degrees before to 15 degrees abaft the beam, and the after ones from 3 degrees before the beam to right astern. Not more than two of the six guns could be fired on any one bearing. Each ship carried also one 20-pounder, one 9-pounder, and one 7-pounder, besides machine-guns. All the guns used by both sides were muzzle-loading and rifled.

It will be noted that all three ships embodied the idea of the end-on attack, and the *Huascar* represented closely the single-turret ship recommended by the Committee on Designs.

At 3.30 A.M., the weather being fine and clear, the *Blanco Encalada*, with a gunboat and a transport in company, was steaming south along the coast in search of the Peruvian ships, when she sighted the smoke of two unknown vessels to the southward. These afterwards proved to be the *Huascar* and a corvette, who, probably seeing the smoke of the *Blanco Encalada* and her consorts, made off to the south-west at a speed of about 10¾ knots, and after about an hour's run altered course to west. The Chilean ships followed at a speed of about 7½ knots. At daylight both sides recognised each other. About 5.40 A.M. the *Huascar* and the corvette hauled up to north and eased to about 9½ knots. At 7.15

POINT ANGAMOS. THE CHASE.

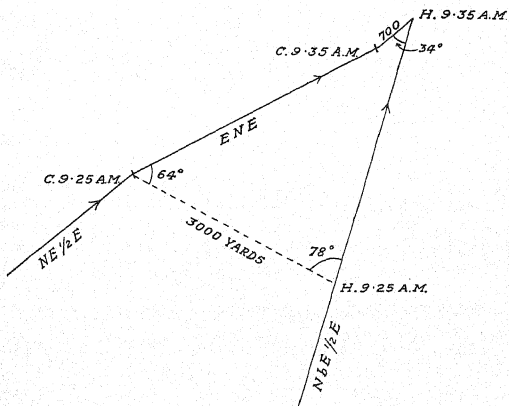


A.M. the *Huascar* sighted smoke to the north-west, and fifteen minutes later made out the *Almirante Cochrane*, a corvette, and a transport. The movements of the small ships on either side did not affect the subsequent action, and may be neglected. The diagrams show approximately the chase and the approach. After an interval the *Huascar* found that the *Almirante Cochrane* was drawing ahead in bearing. To avoid being cut off from her base to the northward she went on at full speed—11 knots—and stood more to the east. This may have been about 8 A.M. With the land some twenty miles to starboard, an enemy of about her own speed on the port bow, and the *Blanco Encalada*, some $1\frac{1}{2}$ knot slower, about four miles astern, it was a question whether the *Huascar* could avoid fighting. She had fallen into the Chilian trap. The results show that superior speed is not always required to force an action on an unwilling enemy.

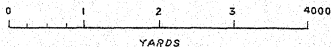
The *Huascar* was now closing the *Almirante Cochrane*, but was drawing away from the *Blanco Encalada*. About 9.25 A.M., the range being about 3000 yards and decreasing at the rate of about 230 yards a minute, the *Huascar* opened fire with her turret guns. The *Almirante Cochrane* did not fire until she reached some shorter range, not exactly known. Some ten minutes later the Chilian ship was well on the quarter of the Peruvian at a range of about 700 yards. She had reached decisive ranges without other injury than that resulting from a ricochet blind 10-inch shell through her unarmoured bow above the belt. She was in an advantageous position, since the *Huascar's* turret guns were masked through fully three points on either quarter. (Diagram, p. 85.)

About 9.45 A.M., or twenty minutes after the first shot was fired, the action culminated with two 9-inch shell from the *Almirante Cochrane*. One of these struck the *Huascar's* turret, perforated the armour at the thickest part, killed and wounded most of the guns' crews, and disabled the right gun, which, it is believed, was not again fired. The other struck, and burst inside, the 3-inch conning-tower, killing the captain of the ship—Admiral Grau—and another officer, besides disabling the engine-room telegraph and the fighting wheel under the conning-tower. The *Huascar* had been already

POINT ANGAMOS
THE APPROACH



H. HUASCAR
C. A. COCHRANE



hit by two or three 9-inch shell,—one of these had perforated the side armour and burst inside the turret chamber, killing and wounding 12 men, some of whom were at the training winches, and jamming the turret for a time.

Up to this time the *Almirante Cochrane* had been hit twice. The first one has been already mentioned; the second struck the 6-inch armour on the battery and glanced off. She was hit only once again during the action, and then by a large shell, which it is thought was fired by her consort the *Blanco Encalada*. This shell did not burst, but passed completely through the unarmoured stern, disabling 10 men.

About 10.10 the *Blanco Encalada* joined in the fight, and was not hit at all during the action.

The *Huascar* never recovered from the single blow which disabled her principal armament. It is true that for the left gun was provided a fresh and inexperienced crew, who kept that gun in action. But their efforts availed nothing, and about 10.25 they were all killed, or wounded, by a second shell which burst inside the turret. She continued to receive the heaviest punishment, sometimes at ranges of less than 100 yards. At 10.55 the *Huascar* surrendered. The action had lasted an hour and a half, during which she had suffered a loss of about 70 killed and wounded out of a complement of 216, and besides many hits from smaller guns had been struck by nineteen 9-inch shell.

Of these nineteen hits (Diagram, p. 87):

Four struck the upper works and did no serious damage.

Two glanced off the side armour and one off the turret armour.

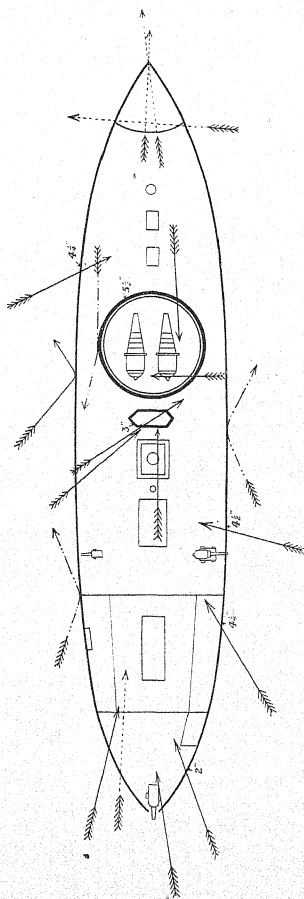
Two perforated and burst inside the turret.

Three destroyed the conning-tower.

Seven perforated the side armour: of these, two disabled the steering gear, one burst in the engine-room but did not disable the engines, another has been already mentioned as bursting in the turret chamber.

The *Almirante Cochrane* fired 45 Palliser shell and the *Blanco Encalada* 31. The percentage of hits to rounds was 28. Not more than four out of the nineteen hits mentioned, or 5.2 per cent of the rounds fired, can have been near the water-line. Indeed, they were so much above it that after the sea-cocks

PRINCIPAL HITS RECEIVED BY THE *HUASCAR* IN THE ACTION OFF POINT ANGAMOS.



The solid arrows denote shots which perforated iron armour plating and exploded inside the vessel, and also the direction from which they came.
 The half-dotted arrows denote shots which hit the armour plating at too oblique an angle to penetrate, but which glanced off, leaving a spoon-shaped dent.
 The dotted arrows mark shots which have merely gone through woodwork above the deck.

had been opened and three or four feet of water admitted into the hold, all were still above water.

The action illustrates several important principles. The doctrine of the "single blow" is seen in practice. The *Huascar* was not knocked out by a single vital blow in the magazines, or by one disabling the motive power, or by the loss of flotation and stability, but by a single shell which put her principal guns out of action. The concentration of the armament in a single turret was a product of the "single blow" idea, and was the main cause of the *Huascar's* defeat. This weakness is inherent in the doctrine, and was pointed out by half the naval members of the Committee on Designs in 1871.

Armour perforable at decisive ranges was shown to be worse than useless. Twelve 9-inch shell perforated the *Huascar's* armour out of the fifteen which struck it. On the other hand, the *Almirante Cochrane's* 6-inch armour did keep out the only shell which hit it, the range at the time being estimated at 600 yards. The action shows how concentrated is the risk with large guns. Hence, it may be thought specially important to give them, if possible, effective protection at "decisive ranges." Is this now possible and practicable? If it is not practicable to protect the gun positions with armour imperforable to direct hits by shell charged with black powder, is it possible to protect them against high explosive shell? Even if this is possible to-day, will it be so to-morrow? Or should we abandon the idea of keeping out all direct hits, protect our gun positions from the indirect effect of bursting shell only, and trust to our guns?

It may be said that thin armour gives protection during "the approach." In this action it did not do so, as it was not hit during that time. Is there more reason to expect any other than chance hits during "the approach" to "decisive ranges" now than there was then? The battle practice, as hitherto conducted, cannot be trusted to give a safe and reliable answer. Will not a determined enemy press in to "decisive ranges," as did Tegetthoff at Lissa? If he does, will the thin vertical armour of the *Invincible* and other classes of ships be any more likely to give adequate protection than did

that of the *Huascar*? If it will not, is not its utility doubtful, seeing that it displaces guns?

As three several attempts failed, the action confirmed the Lissa experience that it was difficult to ram a ship in motion. It also showed that the end-on attack, favoured by the Committee on Designs, was not a sound military principle on which to base the design of a ship of war. Nevertheless, for several years the ram continued in favour, and ships similar in type to the *Huascar* continued to be built. The *Conqueror* was launched in 1881, the *Hero* in 1883, the *Sanspareil* and *Victoria* in 1885.

THE YALU.

The defeat of the Chinese by the Japanese off the Yalu on the 17th September 1894 supplies another example which suggests that false tactical ideals sprang out of the battle of Lissa, were adopted by the Committee on Designs in 1871, and for many years largely governed warship design. The close connection between the tactics employed in the battles of Lissa, the Yalu, and Tsu Sima is a further reason for examining the fight between the Chinese and Japanese somewhat closely.

The names, displacements, and measured mile speeds of the ships present in the battle off the Yalu, together with their complements and guns, are shown in Tables V. and VI.

The two squadrons were equal in the number of ships in the line—ten in each; but the Chinese had two ships—the *Ting Yuen* and *Chen Yuen*—larger and more heavily armoured than any other ship present, while their other ships were smaller than most of the Japanese vessels. In guns—omitting all smaller than 4.7-inch—the Japanese had 102, of which 59 could be fought on one side, including 36 quick-firers, against which the Chinese could bring only 50, of which 40 could be fought on one side and 29 end-on, with no quick-firers, but with some superiority in size. In "hitting capacity" the individual guns on either side were nearly similar, except in the case of the 32-c.m. and quick-firing guns, in which the Japanese had an advantage. The Chinese were supplied with only fifteen rounds of shell for each gun,

and some of their ammunition is said to have been defective. Their military spirit was much inferior to that of the Japanese.

The *Ting Yuen* and *Chen Yuen* were designed to fight end-on, and were launched in 1881-82, when that system of attack was much in favour, although the *Huascar-Cochrane-Blanco* fight had taken place two years before. Their four 12-inch guns were mounted *en barbette* without shields, in two barbettes protected by 12-inch armour and placed in echelon from starboard to port, so that only two guns could be fired on the starboard bow or port quarter.

As would probably have been well known to the Japanese, the Chinese intended to make an end-on attack, but the precise "order" in which it was to be delivered seems to have been in doubt up to the last. The actual "order of attack" was, roughly, an indented line abreast with the wing ships much astern of station. Admiral Ting was in command with his flag in the *Ting Yuen*. It is believed he ranged his ships in order of battle from starboard to port in the order shown in Table V.

The Japanese intended to make a broadside attack in line ahead. With that object in view Vice-Admiral Ito, who was in command with his flag in the *Matsushima*, organised his squadron in two divisions, as shown in Table VI.: a van, or flying division of four ships, with a total broadside of 22 guns, under Rear-Admiral Tsuboi, with his flag in the *Yoshino*; and a main division of six ships, with a total broadside of 37 guns, under the Vice-Admiral's own leadership.

On the 16th of September the Chinese squadron, with transports under convoy, arrived off the entrance to the Yalu river from Talien Whan. The transports, accompanied by two gunboats and two torpedo-boats, at once entered the river to disembark the troops. The *Ping Yuen*, cruiser, and the *Kuang Ping*, torpedo vessel, anchored close off the entrance, and the squadron itself some eight miles farther out.

On the same day the Japanese squadron was at anchor about ninety miles away, off Choppeki Point, where it had been for about forty-eight hours. Neither side knew the position of the other. About 5 P.M. Admiral Ito put to sea,

and proceeded to the island of Hai-Yun-Tau. He says in his report—

On the 17th, at 6.30 A.M., having arrived off the anchorage of that island, I examined the interior of the harbour, and, discovering no signs of the enemy, proceeded for Talu Island, off Takushan. At 11.30 A.M. I observed smoke bearing east-north-east on the starboard bow. It appeared to rise from several steamers.

The course N.E. $\frac{1}{2}$ N. and the bearing E.N.E. indicate the Japanese position at 11.30 A.M. as about 25 miles from Hai-Yun-Tau, and about $21\frac{1}{2}$ miles from the Chinese squadron at anchor. This gives the Japanese a speed of about 10 knots, if Admiral Ito left Hai-Yun-Tau about 9 A.M., which it is understood he did. Probably Admiral Ito at once steered E.N.E. for the smoke. The day was fine, a light breeze gently ruffling the surface of the water.

On the part of the Chinese, the *Chen Yuen's* forenoon routine, drills and exercises, had been carried out, and the cooks were preparing the mid-day meal, when the smoke from the enemy's ships was sighted by look-out men at the masthead. The two squadrons had sighted each other about the same time. Admiral Ting at once weighed and proceeded at a speed of about 6 knots, the ships forming the rough indented line abreast before-mentioned. The *Chao Yung* and *Yung Wei*, being long in weighing, were left astern, and do not seem to have been able to get into station before the action began. The course is not given, but is assumed to have been west-south-west, and straight for the enemy.

Admiral Ito's report goes on—

At 0.5 P.M. . . . having ordered my ships to clear for action, I signalled to the *Saikio* and *Akagi*, in order to ensure their safety, to shift their positions to the port side of the main division. At this time two of the enemy's ships were observed on the port bow.

Assuming the Japanese speed to have been 10 knots and the Chinese squadron to have been under weigh by noon, the distance apart at 0.5 P.M. would have been about $14\frac{1}{2}$ miles. The two ships sighted would have been the two large Chinese ships—the *Ting Yuen* and *Chen Yuen*.

The signal to the *Saikio* and the *Akagi*, before even the

order of the Chinese squadron was known, suggests that the Admiral had already settled his plan of attack. His intention was to approach on the starboard bow of the *Ting Yuen* and *Chen Yuen*—their weak point.

Vice-Admiral Ito continues—

The van division, first headed for the centre of the enemy's line, then gradually kept away to port, and advanced towards the enemy's right wing. The main squadron followed the movement of the van.

The advantage of heading for the centre was that the Chinese would be left as long as possible in doubt as to the flank on which the attack was to be delivered. The van may have stood on without altering course until 0.30 P.M., when the *Yoshino's* distance from the *Ting Yuen* would have been about eight miles. To make clear Admiral Ito's report, and to show the relative positions during the early part of the action, diagrams at five-minute intervals have been drawn to scale on the supposition that the Japanese speed was 10 knots, or 340 yards a minute, until shortly before 0.50 P.M., when the van is assumed to have increased to 15 knots, or 500 yards a minute, and the main division, except the *Hi-Yei*, to 11 knots, or 370 yards a minute. The Chinese speed is taken as about 6 knots, or 200 yards a minute. These diagrams must not be taken as exact representations of what occurred. They only pretend to present an approximate picture of the facts recorded in Admiral Ito's despatch and checked as far as possible by other accounts. The "approach" from 0.30 P.M. to 0.50 P.M. is shown in Diagram I. The Japanese van is seen gradually altering course from E.N.E. to N.E. $\frac{1}{2}$ N. The Chinese squadron is shown turning together from a W.S.W. to a West course, when the Japanese rear-ship was right ahead of the *Ting Yuen*, as reported by an eye-witness on board that ship.

Admiral Ito continues:—

The formation of the enemy's fleet appeared to be single line abreast, but may have been arranged either in echelon or irregularly. In the centre were the sister battleships *Ting Yuen* and *Chen Yuen*, with the *Lai Yuen*, *King Yuen*, *Ching Yuen*, and *Chih Yuen* next them on either side, and with the inferior ships on the flanks, the whole number of the enemy's ships being ten. At 0.50 P.M. the

enemy opened fire on my van squadron at a range of about 5000 or 6000 yards.

A report from the Chinese side says, "Our actual formation was an indented or zigzag line"; and again, "During this early part of the engagement the Chinese fleet, as a whole, kept their indented line and preserved intervals fairly well, steaming at about 6 knots—the *Chao Yung* and *Yung Wei* being still out of station on the extreme right."

Admiral Ito continues:—

The van continued on its course without returning the fire until within about 3000 yards, when it poured in a vigorous reply, and turning to starboard passed round the enemy's right wing. At that time the enemy's principal ships—the wing ships on both sides meanwhile already beginning to head in different directions—bore down with the intention of trying to ram, and also kept up an effective fire. My main division, maintaining throughout a formation in line ahead, attacked the enemy, firing heavily.

Diagram II. shows the Japanese van at 0.55 P.M. about to reply to the Chinese fire. In Diagrams II. and III. the Chinese wing ships are seen at 1 P.M. and 1.5 P.M. beginning to head in different directions, and their principal ships bearing down as if intending to ram.

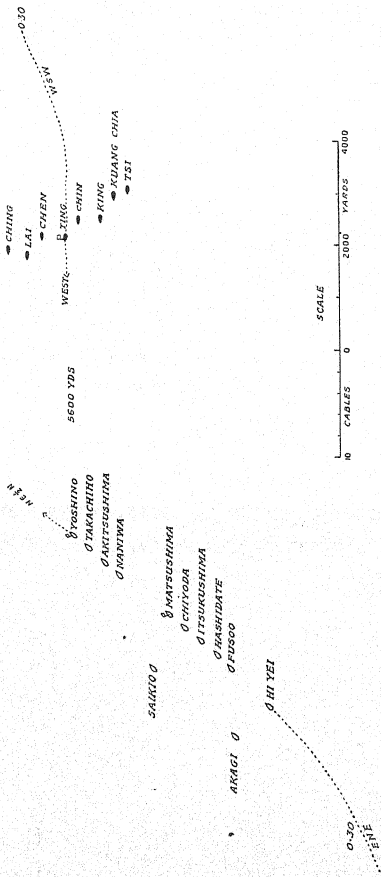
Admiral Ito continues:—

As my rear ships, the *Fusoo* and *Hi-Yei*, drew gradually closer to the advancing Chinese vessels, the captain of the *Hi-Yei*, being of opinion that if he held his course he might be rammed, boldly headed towards the enemy and passed through his line between the *Chen Yuen* and the *Ting Yuen*. Exchanging fire with other ships as well, he rejoined the main division, which by that time had circled round the right wing and was attacking the enemy from the rear.

In Diagram III. the *Hi-Yei* is seen about to pass through the Chinese line between the *Chen Yuen* and *Ting Yuen*. It is very doubtful whether the *Hi-Yei* did rejoin the main division at this time. We have to note that if the Chinese had advanced at greater speed—say 10 knots instead of 6—the whole main division might have been cut off. In that case Admiral Ito's proper reply would have been to do exactly what the *Hi-Yei* did—viz., lead his whole division through

THE YALU. I.

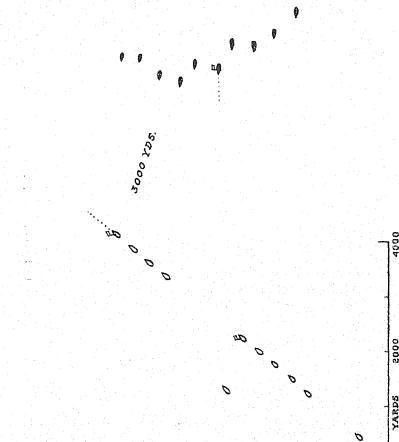
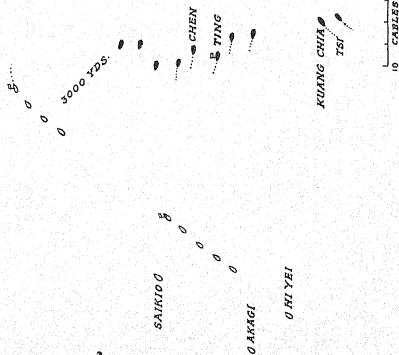
THE APPROACH FROM 0.30 TO 0.50 PM. THE CHINESE OPEN FIRE.



THE YALU II.

1.0 P.M. MAIN DIVISION PROBABLY OPENS FIRE.

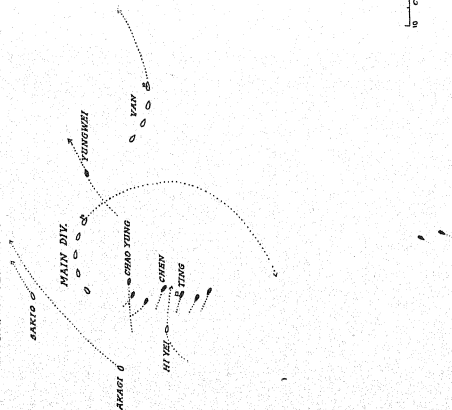
0.55 P.M. JAPANESE VAN REPLIES.



THE YALU. III.

1.10 PM. HI YEI BREAKS THROUGH.

1.5 PM. HI YEI IS CUT OFF.



the Chinese line, his six ships reserving their fire and successively pouring it at the closest range into the two ships between which they passed.

Admiral Ito goes on:—

The Chinese squadron was already so confused that its formation could no longer be said to exist. It was then I observed fresh hostile ships, with torpedo-boats, coming out from the direction of Talu Island, as if to join the main body.

In twenty minutes the fight had seemed to culminate. On the one side the Chinese squadron was no longer an organised force, and had lost heavily. The *Tsi Yuen* and *Kuang Chia* had already run away. Admiral Ito says:—

The *Yung Wei* caught fire, ran across my course ahead of me and went away in the direction of Talu Island, eventually grounding.

The *Chao Yung* was on fire, and began to retire from the action. Notwithstanding these losses, so long as the *Ting Yuen* and *Chen Yuen* were unbeaten, the result was uncertain. On the other side the Japanese squadron was still in hand, except that the *Akagi* and *Hi-Yei* had been cut off. It is probably of the period immediately after this time that Admiral Ito writes:—

During the action the *Saikio* as well as the *Hi-Yei* and *Akagi* were in considerable peril, separated as they were from my main squadron and attacked by several vessels. . . . The *Akagi* was chased by hostile vessels, but, although her captain was killed and both her senior lieutenant and navigating officer, who had successively assumed command after Commander Sakamoto had fallen, were wounded, she creditably got clear, and after being out of action three hours rejoined the squadron. The *Hi-Yei* had a very hot fight while passing through the enemy's line; two torpedoes were discharged at her, but both missed her. She was struck by several shells, and at last catching fire was obliged to haul out of action.

The *Akagi's* loss was 11 killed and 17 wounded, out of a complement of 129, and that of the *Hi-Yei*, 19 killed and 37 wounded, out of 308. The ships that attacked the *Akagi* were some of the smaller ships still remaining with Admiral Ting.

By this time some individual Chinese ships had increased

speed to escape, and others to chase *Akagi*. This increase of speed would tend still further to break up the Chinese "order." Whether the *Ting Yuen* and *Chen Yuen* went on faster is doubtful.

It is now necessary to return to the movements of the Japanese van. Admiral Ito writes:—

After passing round the enemy's right wing, my van division, observing the *Hi-Yei* and *Akagi* as likely to be in great danger, had reversed its course, and heading for a point between the *Akagi* and the enemy, proceeded at its highest speed to the aid of the imperilled vessels, and attacked the enemy on the latter's port side, so that at that moment, while my van was firing into the enemy from one direction, my main division was doing the same from the opposite one.

This turn of the van to port took 22 guns—one-third of the Japanese total—out of action for a considerable interval, at a time when every gun should have been firing on the enemy's principal force at the closest range. Neither fear for the safety of the *Akagi* and *Hi-Yei*, nor the approach of the insignificant Chinese inshore ships, should have diverted the Rear-Admiral from making every effort to destroy the enemy then under his guns. The destruction of the enemy's principal force would have covered everything, and was the surest way to provide for the safety of his own consorts.

The further progress of the battle is so confused that it can only be dealt with in very general terms. The *Akagi* was chased and engaged by ships on her starboard hand. The Japanese van ultimately returned, and, passing between her and the attacking ships, fired on the enemy from a direction opposite to that from which the main division fired. The *Ting Yuen* and *Chen Yuen* seem now to have become separated from their consorts. Admiral Ito writes:—

My van and main divisions subsequently attacked the *Ting Yuen* and *Chen Yuen* from both sides simultaneously. The former was soon in flames forward. My van then proceeded in chase of the runaway vessels, and sank the *King Yuen*, the main squadron still engaging the *Ting Yuen* and *Chen Yuen*.

This means that the Japanese circled round the two Chinese barrette ships at ranges which varied between limits believed to have been wide but not exactly known. A European

on board the *Ting Yuen* reported afterwards: "Five large Japanese ships were circling round us at about 2500 yards."

The Chinese ships, working together, tried to keep end-on to the enemy, but could not always do so, since Admiral Ito continues—

At 3.26 P.M. the *Matsushima*, being then abreast of the *Ting Yuen*, was struck by a 12-inch shell from the latter. The projectile burst in the fore battery, occasioning great damage, and causing fire to break out.

This shell exploded a quantity of ammunition accumulated in the battery, which much increased the damage done. The main division withdrew out of action for a time. The two Chinese ships had now expended all their 6-inch ammunition, and had only a few shot left for the 12-inch guns. About 4.30 P.M. the main division renewed the attack. But Admiral Ito says—

At about 5.30 P.M., seeing that the *Ting Yuen* and *Chen Yuen* had been joined by other ships, and that my van division was separated by a great distance from my main force, and considering that sunset was approaching, I discontinued the action and recalled my van division by signal.

When Admiral Ito stopped the fight and withdrew, after an engagement lasting upwards of four hours, he had two ships—the *Matsushima* and *Hi-Yei*—out of action; but there remained eight who had suffered little, as the following table shows:—

TABLE.
JAPANESE LOSSES.

Ship.	Complement.	Killed.	Wounded.
Yoshino . . .	419	1	11
Takachiho . . .	359	1	2
Akitsuishima . . .	320	5	10
Naniwa . . .	358	...	2
Matsushima . . .	425	35	78
Chiyoda . . .	313	...	...
Itsukushima . . .	362	13	18
Hashidate . . .	362	3	10
Fusoo . . .	353	2	12
Hi-Yei . . .	308	19	37
Akagi . . .	129	11	17
Saikio . . .	118	...	11

It is possible the Japanese ships may have run short of ammunition.

Up to this time the Chinese had lost six ships. The *King Yuen*, *Chih Yuen*, and *Chao Yung* had been sunk, the *Yung Wei* had been beached, the *Tsi Yuen* and *Kuang Chia* had fled. Neglecting the three smaller vessels and the two torpedo-boats, there remained the *Lai Yuen*, very seriously on fire; the *Ching Yuen* and the *Ping Yuen*, neither of whom had suffered much; besides the two barbette ships. The last were both very nearly out of ammunition, and had been severely handled. The *Ting Yuen* had been hit by about two hundred projectiles of all kinds, large and small, and had been set on fire early in the action. This fire was only put out with difficulty some hours later, and after the forepart of the ship had been nearly burnt out. The *Chen Yuen* had been hit nearly as often, and was leaking so badly that on arrival at Port Arthur the next day she was at once placed in dock—being, it is said, then three feet down by the bows. The number of Chinese killed and wounded is not accurately known.

The action throws some additional light on the doctrine of the "single blow." In about three and a half hours the *Ting Yuen* is reported to have fired 120 rounds, and the *Chen Yuen* 77 rounds, from their 30.5-c.m. guns. This means that the guns in each barbette were fired in pairs on an average every eight minutes. The minimum interval was probably four minutes. The Japanese ships were hit by ten 30.5-c.m. projectiles—viz.:

Matsushima	.	.	.	.	.	1 shell	and 1 shot
Fusoo	.	.	.	.	.	1 "	" 2 "
Hi-Yei	.	.	.	.	.	1 "	...
Saikio	.	.	.	.	.	1 "	" 3 "

The *Fusoo* shell should perhaps not be included, as it burst on grazing the water, and only the fragment ricocheted into the ship.

This gives 5 per cent of hits to rounds fired. But of the ten hits only two, or 1 per cent, struck within four feet of the water-line.

Turning to smaller guns down to and including 12-c.m., fourteen Chinese guns of these sizes are reported to have fired 484 rounds, but many more must have been fired, since on one broadside thirty-six such guns in all were in action for varying periods. The Japanese ships were hit by about fifty-eight projectiles, and by about twenty-nine fragments of such from guns of these sizes. Only six of the former struck and perforated within four feet of the water-line. This represents about 10 per cent of the actual hits and less than 1 per cent of the rounds fired.

Unfortunately, neither the numbers of hits on the Chinese ships nor the percentage of hits to rounds made by the Japanese guns can ever be known. But reliable details are at hand relative to the shooting of the Americans in the fight with the Spaniards off Santiago in the year 1898. The facts are—

Guns.	Rounds.	Hits.	Percentage of Hits to Rounds.	Hits.	
				Near W.-L.	On Armour.
12-in. and 13-in.	86	2	2.3	...	...
8-in.	319	10	3.1	...	...
5-in. and 6-in.	644	17	2.6	2	1
4-in.	251	13	5.1	2	...
	1300	42	3.2	4	1

It will be seen that Lissa, Point Angamos, the Yalu, and Santiago, all show that the risk of hits near the water-line is small.

Will an armoured deck and suitable subdivision give to the magazines, motive power, and steering gear, to the flotation and stability, protection sufficient to give time to disarm the enemy and win victory? To mention a concrete case. Was the armoured deck of the *Diadem* to be preferred to the armour belt of the *Cressy*? The dimensions of the two ships were—

	<i>Diadem.</i>	<i>Cressy.</i>
Length between perpendiculars .	435 feet	440 feet
Breadth .	69 "	69½ "
Draught (mean) .	25¼ "	26¼ "
Displacement at full load .	12,000 tons	12,800 tons
Coal at that displacement .	2,000 "	1,600 "
I.H.P. .	21,000	18,000
Speed .	20¾ knots	21½ knots

It will be seen that the *Cressy* carried 400 tons less coal, and her displacement at full load was 800 tons greater than that of the *Diadem*. These 1200 tons were used to increase the percentage of displacement allotted to the various elements as follows:—

	Difference for <i>Cressy</i> .
Armament	+ .4
Armour	+ 4.3
Machinery	+ 1.3
Coal	- 4.2
Equipment	+ .2
Hull and wood sheathing	+ 1.6

The additional armour carried by the *Cressy* was equal to the entire weight of the armament of the *Diadem*. Was that a wise addition? Was the reduction in the coal carried expedient? The first cost of the *Diadem* was £555,000, as against £749,000 for the *Cressy*. Did the extra £194,000 result in a corresponding increase in fighting value?

Returning to the hits on the Japanese ships, were any of these vital? Two only need attention. The shell that hit the *Hi-Yei* about 1.30 P.M. burst in the ward-room, which was being used by the surgeon's party, and then contained 13 people. The casualties were 14 killed and 26 wounded, of whom 4 died. The ship was set on fire, and having been hit by 22 other projectiles, drew out of action, with a total loss of 19 killed and 37 wounded, or about one-sixth of her complement—or one-fifth if those below the lower-deck are omitted,—which is not large when compared with the *Bellerophon's* loss of one-third at the Nile. It must be remembered that the *Hi-Yei* was a small ship of about 2200 tons.

About 3.26 P.M. two 12-inch projectiles struck the *Matsushima* together close to the second 4.7-inch gun on the port side of the gun-deck. One of these was a shot which need not detain us. The other was a shell which struck the shield and burst, igniting a large amount of ammunition piled on the gun-deck, much of which was close to the supply scuttle. The whole quantity was estimated by the Japanese as possibly sixty-seven 4.7-inch cartridges, each containing about 21 lb. of powder, and would thus have been about

1400 lb. The double explosion killed 30 and wounded 70 persons, of whom 22 died subsequently. The whole battery was put out of action, and the ship was set on fire. The main division withdrew out of action temporarily, while the flagship made good the damage.

On the other hand the *Chih Yuen* does seem to have been sunk by a single blow. Whether this was caused by a Japanese torpedo, or by one of her own while still in the tube, or by a shell, there is no sufficient evidence to show.

Another point worthy of remark is that while the four 30.5 c.m. projectiles which struck the *Saikio Maru* only wounded 5 people, a 6-pounder shell killed 4 men and wounded 6 on board the *Itsukushima*. A large shell in the wrong place may not be so effective as a small one on the right spot.

The action off the Yalu was very similar to that off Lissa. In each case a broadside attack in line ahead was pitted against an end-on attack in rough line abreast, or double quarter line. Ito crossed ahead of the advancing Chinese just as Persano tried to do. The angle between the courses was about the same— $4\frac{1}{2}$ to 5 points. The Japanese with a great superiority of speed had only one ship cut off, whereas the Italians with equality in speed had six. The Yalu exposed to view the error of the conclusions drawn from Lissa. In both battles the more efficient Admiral won. In each action the winning fleet was worked in divisions, as was the British fleet in the Dutch wars and at Trafalgar, and the Japanese fleet afterwards at Tsu Sima. This was the root idea of the proposals in the lecture delivered to the War Course on the 18th of January 1905, and afterwards put into practice in the Channel Fleet in 1907-8. The conception grew out of a study of Nelson's Trafalgar memorandum. Its essence was to make the fleet flexible in the hands of the Admiral, and to enable any part to be moved by the shortest line to the position where it was most required. The idea was based on war practice. Of what use would equal speed movements have been to either side at Lissa, the Yalu, or Tsu Sima?

The battle illustrates more than one important military

principle. During the opening phase the Japanese seemed to carry all before them, but in the end neither side had been disarmed and reduced to silence. The action between the two Chinese ironclads and the Japanese squadron was indecisive, because neither side had been hit often enough. On the part of the Chinese this was due to the faulty system of armament, which not only entailed a low "firing capacity" in the barbette ships, but led to the end-on fight and to an ineffective use of the gun. On the part of the Japanese, with whom rested the command of speed and partial control of the range, the failure was due to fighting at long variable distances—a condition unfavourable to hitting and entailing great waste of ammunition. Admiral Ito forgot the teaching of Farragut, who at Mobile Bay showed that unarmoured ships must press in to close ranges to make their fire effective against armoured ships. Unlike the American Admiral, the Japanese showed no determination to defeat the two Chinese ships at all costs. The root idea of his tactics was not to disarm the enemy, but to avoid being hit—not victory, but safety. He forgot that high speed and a rapidly changing range made ineffective his own fire as well as that of the enemy. The result was indecision.

Again the need to make every effort to disarm and defeat the enemy's principal force is shown. The destruction of his lighter ships brought no real decision. Hence is seen the mistake made by the Japanese in turning the van to port, already mentioned, and in detaching it later on in chase of runaway vessels, while the enemy's real main force—the *Ting Yuen* and *Chen Yuen*—was still unbeaten.

At the Yalu, as in the actions between the *Alabama* and *Kearsarge*, the *Atlanta* and *Weehawken*, the Italians and Austrians at Lissa, and between the *Huascar* and *Almirante Cochrane*, the side which ultimately fared worst was the first to fire. To open fire at long range during the approach usually results in a waste of ammunition, shows want of confidence, and is a sign of military weakness. As a rule the winning side reserves its fire until decisive ranges are reached.

The veterans of the great wars of the past well understood that true safety was only to be found in disarming the enemy

by superior gun-fire. Fifty years ago this principle was abandoned. Armour was introduced at the expense of gun power. Instead of trusting to their guns, men came to look to armour for protection and safety. This idea grew until seven times as much weight was allotted to the armour as to the guns. Thus, it came about that ships became nearly powerless as instruments of war. The increasing power of the gun gradually made it impossible to carry armour imperforable at decisive ranges. But the call for safety was still predominant. Ships increased in size to carry the thicker armour demanded, but this still remained perforable. The idea of safety then suggested that actions should be fought at long ranges, where armour might still give protection. To ensure long ranges superior speed was demanded. Thus, at the back of long range and superior speed was the idea of safety. But—

“Self-preservation, nature’s first great law,
All the creation, except man, doth awe.”

Men bent on disarming and destroying the enemy would never have thought of fighting at long ranges. On the contrary, the fact that armour was perforable would have been a reason with them for closing in to decisive ranges. They would have reasoned that as true safety is only to be found in disarming the enemy, the quicker that is done the better. Our watchword should be, not safety, but the victory which is only to be won by well-served guns in sufficient numbers at “decisive ranges.”

V.

THE OPENING OF
THE RUSSO-JAPANESE WAR.¹

THE war between Japan and Russia in the years 1904-5 was a struggle for the control of Southern Manchuria and Korea. The statesmen of the former Empire thought that the rule of the latter in those countries, and especially in Korea, would be a menace to the safety and wellbeing of Japan. The issue of the struggle turned first and principally on sea command—*i.e.*, on the defeat of one of the two navies; and secondly, if the Japanese secured control of the sea, but not otherwise, on the defeat of one of the two armies. If the Russian Navy won the decisive battle at sea, no Japanese army could operate on the mainland. A complete decision required not only the defeat but the capture or destruction of the opposing force. Thus on both sides the naval objective should have been the capture or destruction of the hostile fleet with the ultimate aim of controlling the sea communications, which the Russians should have sought to close and the Japanese to open. From these fundamental conceptions we can now pass to a closer study of the war on its naval side.

In the first place we are to remark that in the year 1895 the three powers, Russia, France, and Germany, forced Japan to retrocede to China the Liaotung Peninsula, the chief fruit of the victorious war just concluded. The island power

¹ Read on the 1st of June 1911.

then foresaw the possible necessity of a further appeal to arms, and began steadily to prepare for it. But not until the year 1903 did the policy of Russia in Manchuria and Korea become so aggressive as to compel Japan to begin in July of that year the actual negotiations, which culminated in war seven months later. The Russian official history shows conclusively that during these negotiations both powers had ample opportunities to see that war was probable and the need to prepare for it. Japan alone fully understood all that was involved in an appeal to arms. She not only provided the necessary naval and military force, but what was much more important, her admirals and generals set themselves to learn how to use it in war. They fully understood that this knowledge was not to be derived from the routine peace duties either of an administrative post or of a sea-going fleet, but chiefly from the close study of past masters of the art of war.

In accordance with the aggressive turn in her policy Russia began, during the year 1903, to reinforce her fleet in the East. The first addition reached Port Arthur in July, and the last to join before the outbreak of war, the *Tsesarevitch* and *Bayan*, arrived in November. Unlike the Japanese fleet the force thus collected does not seem to have been organised, and is shown in Table VII., a mere mob of ships. The chief command was held by Vice-Admiral Stark, who was at Port Arthur in the *Petrovsk* with Rear-Admiral Prince Ukhtomski in the *Peresvyet*, and Rear-Admiral Baron Stakelberg at Vladivostock. But over all was Vice-Admiral Alexieff, the Viceroy, who controlled all the Russian forces in the East, both by land and sea.

The Japanese fleet began to assemble at Sasebo as early as August 1903, and in October had reached such strength that Vice-Admiral Togo was appointed to the command. Towards the end of December the ships were formed into a so-called "combined fleet" of two squadrons under Vice-Admiral Togo, with a third squadron in Reserve under the separate command of Vice-Admiral Kataoka. The whole organisation is shown in Table VIII.

The first and second squadrons each consisted of one

division of ships fit for the line, and of one division of cruisers, besides flotillas of destroyers and groups of torpedo-boats. Attached to the fleet were a number of merchant ships for auxiliary services.

The third squadron included two divisions of cruisers, a mixed division of coast defenders and small craft, besides groups of torpedo-boats and some mercantile auxiliaries.

Not included in the organisation of the above three squadrons were—

8 cruisers, 3rd class.	
1 gunboat.	
31 large torpedo-boats	} in fourteen groups.
27 small " "	

It is interesting to note that the real working unit during the war seems to have been the division and not the squadron, and also that in less than a month after the war began the third squadron came under the orders of Vice-Admiral Togo.

It will be observed that in these tables a return has been made to the practice of our war-trying predecessors, who made a broad distinction between ships fit to take post in the line and those not powerful enough to be placed there. It is evidently proper that the classification of warships should depend primarily on the military use to which they are put rather than on the characteristics of their construction. The terms "battleship" and "cruiser" do not draw any such distinction, since all warships are built for battle, and all cruise. The additional words "armoured" and "protected" only indicate details of construction, and are misleading from a military point of view. The term "battle cruiser" shows the present confusion of thought, and the necessity for a scientific nomenclature. The ships included as "of the line" are the battleships and armoured cruisers actually "in the line" during the general actions of the war.

Summarising these tables, we find that the naval forces of the two belligerents available in the eastern seas at the outbreak of war in February 1904 consisted of—

		Russia.	Japan.
Ships of the line		10	12
Unclassed or Intermediates . . . . .		...	2
Cruisers and Small craft	Cruisers—		
	First class	6	...
	Second class . . . . .	...	10
	Third class	2	17
	Sloops and gunboats	12	11
	Destroyers	25	19
	Torpedo-boats—		
	Large	10	58
	Small	7	27

N.B.—The *Chinyen* and *Fuso* are reckoned as Unclassed or Intermediates.

The Russian line-of-battle strength was 10 ships, whose united broadsides were 100 guns, including 20 12-inch and 8 10-inch, while that of the Japanese was 12 ships with 124 guns, of which 24 were 12-inch. Although their Navy as a whole was the stronger, the Russians were inferior in strength. In cruisers the Japanese were superior in number—27 to 8—but as they had to provide convoys for the army transports and to assist in landing the troops their requirements were greater. Attention may be called to the 6 heavy Russian cruisers whose united broadsides amounted to 37 guns of 6-inch and 8-inch calibre. Unlike the Nelsonian frigates, these ships carried guns not only effective against ships of the line, but of such range that all could be brought into action against, and the effect of their fire concentrated on, one or two more powerful ships. Individually of no great force, collectively, in the hands of a determined man, they were by no means to be neglected.

To the force just mentioned Japan could expect to add to her ships of the line the *Kasuga* and *Nisshin*, armoured cruisers bought in Italy, which reached Yokosuka on the 16th of February 1904, and joined the "combined fleet" on the 11th of April. To her cruisers the *Tsushima* was added in February, and the *Otowa* in August 1904. Beyond these ships no additions could be looked for during the war. Behind the Russian fleet was a force of which a detachment had already reached the Red Sea on the out-

break of war, but did not then proceed further, while in Europe were preparing further uncertain reinforcements, which, added to the aforesaid detachment, became eventually the so-called Baltic fleet. The Russian squadron in the Black Sea was also a possible factor which could not be forgotten.

The Russian plan of campaign by both sea and land had been under discussion for some years before the outbreak of war. On the 11th April 1901 a naval committee, of which Vice-Admiral Alexieff was Chairman, reported that the mission of the fleet was to conquer the command of the Gulf of Pechili, the Yellow and South Korean Seas; that a Japanese disembarkation at Chemulpo and at the mouth of the Yalu would then be impossible, while the Russian army would be able to concentrate on the line Mukden-Liao Yang; that to carry out this mission with the greatest chances of success, the fleet should be divided into two groups—viz., a main body, based on Port Arthur, to bar access to the Yellow Sea, and prevent a disembarkation on the west coast of Korea, with a detachment, based on Vladivostock, to act on the enemy's communications, to raid his coasts, and thus to draw away a part of the enemy's fleet from the Gulfs of Korea and Pechili. This plan was reconsidered from time to time, and notably on the 30th of April and 31st of December 1903. On neither occasion was any change thought to be necessary. On the 9th of January 1904 Rear-Admiral Baron Stakelberg, who was in charge of the detachment at Vladivostock, was instructed to put to sea on the outbreak of war, and to raid the west coast of Japan from north to south, destroying shipping, lighthouses, and signal stations, sinking transports, and generally creating alarm. It will be noted that the plan deals chiefly with ulterior objects, and lays little or no stress on the pressing need to defeat the Japanese fleet, on which all else turned, and to which all efforts should have been directed.

Turning to the land campaign, we need not go back further than the 25th of September 1903, when the Russian General Staff called by telegraph on Major-General Flug, the Military Officer on the Staff of the Viceroy, Vice-Admiral Alexieff,

to reconsider the strategical distribution of the troops in the extreme East in the event of war with Japan. As the whole plan of campaign on land turned on the part taken by the fleet at sea, the Major-General on the 8th of October put these two questions to Rear-Admiral Vitgeft, the chief of the Naval Staff:—

“Can we count upon no hostile landing at Yinkou (Newchwang) at least during the first month after the order for mobilisation?” And, “If the Japanese decide to land on the shores of the Gulf of Korea, for how long can our fleet, allowing that it gains no decisive success over the hostile Navy, retard a landing in that Gulf?” The reply, dated October the 10th, ran: “So long as our fleet is not destroyed the two operations named . . . are absolutely impossible. My personal opinion is that, even given the present relative strengths of the forces in presence, our fleet cannot be beaten by the Japanese fleet either in the Gulf of Korea or in the Yellow Sea.” It is to be noted that the *Tsesarevitch* and *Bayan* had not yet reached the station when this answer was given. The plan prepared by the Major-General and the decision to concentrate the army with a view to a battle at Liao Yang are said to have been based on the Rear-Admiral's answer. As the question and the reply bear on the general subject of invasion over sea they merit particular attention. The Major-General asked how long the Navy could delay the landing. The Rear-Admiral replied that landing was impossible so long as the fleet was not destroyed, and that the fleet could not be beaten under the conditions then existing. After events proved that this answer was much too sweeping, and that the Rear-Admiral had not fully mastered the problem. The complete destruction of the Russian fleet, although very desirable, was not necessary to ensure the safety of the Japanese transports. To cripple and drive it into port and to impair confidence in its leader proved sufficient to enable the Japanese to transport their army to the mainland, but so long as the Russian fleet was not destroyed all danger was not removed. Again the result of the encounter between rival forces does not turn exclusively on their relative material strength as the Rear-

Admiral seemed to suppose, but much more, and chiefly, on the use made of each. The directing mind and the military spirit are the deciding factors. The personalities of the commanding Admirals are of immense importance, and until these are known it is vain to prophesy.

Before proceeding further it may be well to dwell on the real influence of the sea command on the land operations. With Russia in full control of the sea nothing could happen on land, since no Japanese army could then cross the sea, while Russia had no object in invading Japan, even if an army of sufficient strength with the necessary transports were available, which was not the case. With Japan in full control of the sea, her army could land anywhere on the mainland, and the Russian Generals saw clearly that she would first seek to establish a firm hold on Korea with a view to providing a line of retreat in case of defeat, and that her armies would effect landings on a broad front extending from Tsinampo on the right to Kwang-tung, or even Ying Kou, on the left. With the actual forces in presence in such narrow waters, and the pressing need of Japan for a quick decision both by land and sea before Russian reinforcements could arrive from Europe, it is held that Japan had no option but to seek for full control of the sea without delay. The quickest and most complete way to assure this was not to confine the Russian ships in harbour, but to induce them to come out with a view to their destruction. Was that feasible?

The actual distribution of the Russian force on the 5th February 1904 is shown in Table VII., from which it will be seen that the ships of the line were divided, seven being at Port Arthur and three at Vladivostock. Of the cruisers the *Varyag* was at Chemulpo, the *Bogatyr* at Vladivostock. The sloops and gunboats were much scattered. On the same date the whole Japanese Navy available was concentrated at Sasebo, except the seventh division with destroyers and torpedo-boats which were about eighty miles distant at Takeshiki in Tsu Shima Sound; the fifth and sixth divisions, which were about to move to the same place from Kure in the Inland Sea, the *Chiyoda* at Chemulpo, the *Kasuga* and *Nisshin* at Singapore on passage out.

The Russian ships of the line were divided into two squadrons about eleven hundred miles apart, with the Japanese fleet massed in a central position between them. The Russian dispositions were very unsound. They underrated their enemy, divided their fleet, and aimed at securing the command of the Yellow Sea with an inferior force. They should have maintained a larger squadron in the Far East, and should have concentrated every ship and every gun that could contribute to victory. The reason they did not concentrate is evident. Not understanding that the true aim in war is always to destroy the enemy's fighting force, and that this could only be done by a superior force, they weakened their main fleet by a detachment to raid the coast of Japan, an altogether secondary operation. They seem to have thought that the Japanese might attempt a similar diversion by making a demonstration on the east coast of Korea. They were now to learn the error of the idea, long current among them, that attack on the trade would create a powerful diversion. That idea had produced the "armoured cruiser." Misled by the name, they may have thought such ships would not add to the line of battle strength. If such was the case, the importance is shown of using proper terms and the danger of not doing so. The abolition of the misleading and unscientific term "armoured cruiser" is a pressing need.

We are now to remark that on the 13th of January, after prolonged negotiations, the Japanese Ambassador at St Petersburg handed to Count Lamsdorf the final proposals of Japan, and pressed for an early reply. As the Russian Military Attaché pointed out, this document was in the nature of an ultimatum, and Japanese action might be expected to follow. Telegrams now began to reach both St Petersburg and Port Arthur from Tokyo reporting the chartering of transports, the laying of mines at Sasebo, the landing of provisions at Chemulpo and Gensan, the departure of Japanese from Khabarovsk and other towns for their own country. On the 28th the telegrams from the Military Attaché at Tokyo began to be received in a mutilated state. There could be no doubt that Japan was pushing on her war preparations which, as after events proved, were now in a very forward state.

On the part of the Russians a telegram dated the 12th of January directed the Viceroy to prepare for mobilisation, and to place Port Arthur and Vladivostock in a state of defence. As the distance and the difficulties of transport were great, the Russian staff thought it very important to gain time to complete their mobilisation and concentration. The time available depended largely on the places in Korea where the Japanese landed. Should their landing be opposed by the Russian fleet? On January the 27th and 28th the Viceroy was instructed that he was not to oppose a Japanese landing in Korea on the east coast south of the parallel of Seoul, and on the west coast as far north as Chemulpo inclusive.

On the 30th the Japanese Ambassador asked Count Lamsdorf to name the day on which the answer to the final proposals would be given. No date could be named. On the 3rd of February the Port Arthur squadron put to sea, its destination being unknown. Its departure was reported at Tokyo on the following day and precipitated events, as the Japanese thought an attack might be intended. This was not the case since the squadron only went out for twenty-four hours, and then again anchored outside Port Arthur. That same evening, the 4th, the Emperor of Japan presided over a Council which decided on war, and on the 5th, orders were transmitted to the Ambassador at St Petersburg to break off diplomatic relations, and to the Naval and Military Commanders to take action.

On the morning of the 6th the Japanese ships and troops put to sea; at 9 A.M. the Russian steamer *Ekatereinoslaw* was captured—the first act of war—and in the afternoon the necessary diplomatic communications were made at St Petersburg and Tokyo. The Japanese were taking action. What was the attitude of the Russians at this time? It was not until 11.30 A.M. on February the 8th that the Czar presided over a Council to determine the action to be taken. Previous to the Council the Chief of the General Staff pointed out to General Kouropatkine, the Minister of War, the need to oppose the Japanese landing in order to gain time to mobilise and concentrate, and the probability that the Japanese would attack the Russian fleet in order to

cover the landing. After the Council the Czar telegraphed to the Viceroy: "It is desirable that the Japanese should open hostilities, and not we ourselves. Consequently, if they do not begin operations against us, you will not oppose their disembarkation in South Korea, or on the east coast as far north as Gensan inclusive. But if, on the west coast, their fleet, with or without troops, pass north of the 38th parallel, you can attack it without waiting for the first shot from them."

We are now to note how similar were the respective characteristics of the naval combatants to those which obtained in the Lissa campaign. At the outbreak of war, the Japanese, like the Austrians, were concentrated, organised, and imbued with a high military spirit. The war of 1894-5 with China had shaped their war ideals. Their leaders had some conception of war, and knew exactly what they wanted to do. Their preparations were complete, and they meant to take the initiative. The Russians, like the Italians, were neither concentrated nor organised. Their military spirit was low. Their leaders had no experience of war, and had no true conception of its nature. Their preparations were incomplete, and their dilatory councils left the initiative to their enemies. It is evident that the seeds from which grew the Russian defeats had been sown long before the war began. In the truer military ideals of the Japanese, and not in better ships, are to be found the explanation of their victories.

The Japanese main fleet sailed from Sasebo on the 6th. The divisions put to sea in succession. First went at 9 A.M. the 3rd under Rear-Admiral Dewa, with five flotillas of destroyers, two groups of torpedo-boats, and some auxiliary ships; afterwards followed the 2nd under Vice-Admiral Kamimura; the 1st under Vice-Admiral Togo; and lastly, at 2 P.M. under Rear-Admiral Uriyu, the 4th and the transports carrying troops to disembark at Chemulpo. On the afternoon of the 7th all were at the rendezvous off Single Island, some 200 miles from Sasebo. Thence about 4.30 P.M. Rear-Admiral Uriyu with the 4th division, torpedo-boats, and transports, proceeded for Chemulpo, distant about 180 miles, while Vice-Admiral Togo with the main force made

for Port Arthur. Rear-Admiral Uriyu was off Baker Island, 128 miles, at 8.30 A.M. on the 8th, and there met the *Chiyoda* from Chemulpo, whence that ship had sailed at midnight. Her commander, whose position after the capture of Russian ships on the 6th had been very delicate, reported that he had left there the *Varyag* and *Korietz* besides four foreign ships of war. After some delay at Asan Bay to complete the final arrangements, the Rear-Admiral proceeded, and presently met the *Korietz*, quite unprepared for action, coming down the river. As she passed, the torpedo-boats turned after her and fired two torpedoes, both of which missed. She turned back, firing in reply a few rounds without effect. The Japanese arrived at Chemulpo about 5.10 P.M. and began to disembark the troops one hour later. On the following day, the 9th, they defeated and caused the destruction of the two Russian ships. The details of the action will be given later on.

Returning to the main fleet, Vice-Admiral Togo with the 1st and 2nd divisions and five destroyer flotillas proceeded about 5 P.M. on the 7th for Round Island, distant some 320 miles. Rear-Admiral Dewa was detached with the 3rd division to "make" the Sir James Hall group and then rejoin, which he did about 11 A.M. on the following day, having seen nothing of the enemy. At 6 P.M. Vice-Admiral Togo, with the three divisions and all the destroyers, was about seventy miles E.S.E. from Port Arthur. The 1st, 2nd, and 3rd flotillas (10 boats) were now detached to attack any ships outside that port, while the 4th and 5th were to go to Dalny on a similar mission. When Vice-Admiral Togo moved north into the Yellow Sea, Vice-Admiral Kataoka, acting under direct orders from Tokyo, held the Straits of Korea with the third squadron. Thus, allowing for difference of longitude, at the very time on February the 8th when the Czar was presiding over his council and deciding to give up the initiative, the Japanese were commencing hostilities; they were not only seizing merchant ships and landing troops at Chemulpo, but despatching an expedition to attack the Russian fleet. This is exactly what the Chief of the Russian General Staff predicted would happen.

When a decision is taken to abandon the initiative to the enemy, it is of transcendent importance to guard against surprise. What naval precautions were taken by the Russians? None adequate to the occasion. The *Varyag* and *Koreetz* were left at Chemulpo at the head of an estuary thirty-five miles long, whence withdrawal in the face of an enemy was difficult. Their exposed position does not seem to have been the least understood by Vice-Admiral Alexieff, whereas the risk run by the *Chiyoda* at the same anchorage was fully realised by the Japanese. After the belated Council, at which was taken the decision not to oppose either a landing in Korea or the occupation of that country, the presence of these ships at Chemulpo was useless, but it was then too late to withdraw them.

At Port Arthur the squadron was quite unnecessarily left exposed to attack in the outer anchorage. The Viceroy, Alexieff, and his immediate staff alone knew that diplomatic relations had been broken off on the 6th. He had received orders on the 7th which left him free to take all needful precautions, but he did no more than issue orders to the army to keep a strict watch to seaward and to defend the entrance to the harbour. On the part of the Navy only such perfunctory precautions as are not uncommon during peace manœuvres were taken to guard against surprise. The squadron was not kept ready to repel instantly an attack. Two ships worked their search-lights, but no definite orders to open fire were given. Two destroyers patrolled in the offing, showing their navigation lights, and with orders, in the event of meeting suspicious craft, not to fire, but to return and report to the Flagship. The Russians, having neither war experience nor the knowledge which comes from study and reflection, failed to realise the immense difference between peace and war conditions, which, in marked contrast, was fully understood by the Japanese, as proved by their elaborate precautions when war was imminent. The destroyers on patrol sighted the Japanese flotillas, but gave no warning, so that the first boats to attack were able to discharge their torpedoes some minutes before the Russian ships opened fire. The details of the attack need not be

given. It will suffice to say that ten boats fired eighteen torpedoes and only three took effect, although the conditions were most favourable—the night fine and moonless, the ships at anchor, and the enemy's look-out bad. The *Tsesarevitch*, *Retvizan*, and *Pallada* were struck, but did not founder, and the damage inflicted was far less than was expected by the professional opinion of the time. The Japanese destroyers were not damaged, and suffered no loss in any way. Is it quite certain that in peace exercises destroyer attacks are conducted on right principles?

The Russian Admiral Stark, like the Italian Admiral Persano off Ancona in 1866, had been taken completely by surprise. He now had in hand only five ships of the line to meet Togo's twelve and was unequal to a general action. As soon as the news of the Russian reverse reached St Petersburg, an efficient officer, Vice-Admiral Makaroff, was appointed to the Chief Command of the Pacific fleet. That appointment was made too late. Important posts should be filled by efficient officers in time of peace.

The Japanese had gained a great advantage. Could they improve on it and destroy the Russian fleet at anchor? During the night Togo with the three divisions remained several miles from the port. At 7 A.M. he detached Rear-Admiral Dewa with his division (3rd) to reconnoitre and ascertain the result of the destroyer attack. The flotillas had returned direct to Korean waters without communicating. Dewa was sighted from Port Arthur at 8 A.M., and on rejoining reported that he had been within 7500 yards of the batteries without being fired on, that outside the harbour were several ships, of whom three or four were aground with heavy lists and apparently injured. At 11 A.M. Vice-Admiral Togo, being then twenty miles south-east of Port Arthur, shaped course for it with the three divisions in single line ahead, and at 11.55 A.M. engaged the Russian ships and batteries, the opening range being 8500 yards. After an abortive engagement, lasting about forty minutes, the Japanese withdrew, having lost 73 officers and men killed and wounded, against a Russian loss of 122 in the ships and 7 on shore. Togo had missed whatever opportunity there may have been. If, instead of sending in only the 3rd division, he had closed

with his whole force early in the morning, he would have run little risk from the enemy's destroyers and would have been in a position to attack if opportunity offered. There is reason to believe, such was the confusion and want of preparation ashore and afloat, that he would probably have been able to destroy the whole Russian squadron. How came Vice-Admiral Togo to miss his opportunity? The Japanese Government may have instructed their Admirals not to risk their ships, which could not be replaced if lost. Owing to some such cautious instructions or for other reasons, full use of their naval superiority does not seem to have been made, and more than one opportunity to destroy the enemy's ships appears to have been missed. It is doubtful whether this cautious policy was wise.

The opening phases of the war have been sketched to show that the early Russian defeats were due to inferior leading and not to any difference between the ships on either side. Our aim is not to give a detailed account of the war, but from the facts to seek the military principles which govern the design of war-ships. This will require a somewhat full account of the main tactical features of each battle, coupled with so much of the strategy as bears on the tactics. We begin with the action at

CHEMULPO.

On the morning of the 9th of February 1904, the Russian ships *Varyag* and *Koreetz* were at anchor off Chemulpo. The elements of their fighting power were :—

	Displace- ment.	Measured mile speed.	Guns on one side.			Crew.
	tons.	knots.	8-inch.	6-inch.	12-pr.	
Varyag . . .	6500	23	...	8	6	553
Koreetz . . .	1270	13.5	1	1	...	179

Small quick-firing and machine guns are not shown.

Off Philip Island some eight miles distant was a Japanese

squadron under Rear-Admiral Uriyu with his flag in the *Naniwa*. The ships were:—

	Displacement.	Measured mile speed.	Guns on one side.				Crew.
	tons.	knots.	8-inch.	6-inch.	4.7-inch.	10-pr.	
<u>Asama</u> . . .	9750	22	4	7	...	6	637
<u>Chiyoda</u> . . .	2450	19	...	...	6	...	316
<i>Naniwa</i> . . .	3650	18	...	5	...	...	338
<i>Niitaka</i> . . .	3360	20	...	4	...	5	320
<i>Takachiho</i> . .	3650	18	...	5	...	...	342
<i>Akashi</i> . . .	2750	20	...	2	3	...	305
3 torpedo-boats .							

The ship underlined had some vertical armour protection.
Small quick-firing and machine guns are not shown.

The day being fine with a light breeze from the south-east and a calm sea the Russian ships weighed at some time not exactly known, but by 11.30 A.M. they are believed to have been under way, and proceeding down the river. The speed is not given, but the Captain of the *Koreetz* in his report says that he proceeded at half speed, which may be taken at 10½ to 11 knots. The tide was ebbing at about 1¾ to 2 knots, so that, as the ships kept company, their speed over the ground may be taken as 12 to 13 knots, which would have brought them in about twenty minutes (11.50) to a position about 4000 yards from Yodolmi Island, and about 7500 yards from the spot where the *Asama* had been at anchor. The course steered is not given, but the necessities of navigating a long channel not more than one mile wide made it probably about S. 28° W. It is proper to note that high water on that day was at 10.36 A.M., and that during the action the water was about 20 feet higher than is shown on the chart.

When the Russian ships were about 8000 yards from Yodolmi Island (11.40) they seem to have been observed and reported by the *Asama*. The *Naniwa* and *Asama* at once slipped and stood to the southward, the *Asama* leading and followed by the *Chiyoda*; the *Naniwa* was soon joined by the *Niitaka*. The *Takachiho*, *Akashi*, and torpedo-boats stood to the south-westward, but as they seemed to have taken little

part in the action, their movements may be neglected. Ten minutes after the enemy was sighted the *Asama* is said to have opened fire (11.50). The *Varyag* at once replied, as also did the *Koreetz*, who was engaged by the *Chiyoda*. The other ships fired as opportunities offered. The opening range has been variously given—as 9000 yards by the Captain of the *Varyag*, and 6800 yards by Captain of the *Asama*, while that adopted in the official history is 7500 yards.

The *Asama*'s course at this time has not been given, but the necessities of navigation and the wish to keep her guns bearing point to a course about S. 5° W. which would make the angle between the courses about two points. To allow for the tide the course laid down on the plan is S. 11° W. On opening fire the *Varyag* probably bore about N. 77° E. from the *Asama*, and the latter was about fifty degrees on the starboard bow of the former, while the former was about twenty degrees abaft the beam of the latter. All the *Asama*'s guns would bear on the *Varyag*, but not *vice versa*, and consequently some of the *Varyag*'s guns were probably laid on the Japanese rear ships.

The *Asama*'s speed is not given, but if it be true, as stated in our official history, that she turned sixteen points to starboard (0.5) about fifteen minutes after opening fire, the necessities of navigation and the need to keep her guns bearing would have limited her to a speed somewhat lower than that of the *Varyag*, say nine knots. On these assumptions by 0.5 the bearing of the *Varyag* from the *Asama* would have changed to about N. 70° E., and the distance to about 6000 yards. The ships would have closed during this critical quarter of an hour at the comparatively slow rate of about 100 yards a minute, or three knots an hour, but the relative bearings would have remained fairly constant. These conditions were not unfavourable to good shooting on the part of the *Asama*, but towards the end of the period the *Varyag* was already under helm and throwing her guns out of action. Not one of the Japanese ships nor the *Koreetz* suffered any loss from the enemy's fire. The *Varyag* alone was hit. Her Captain's report refers to the effect produced during the first fifteen minutes by three particular shell, but she may have then received other direct hits besides ricochets from frag-

ments of shell which burst short. During this time seven 6-inch and nine 12- and 3-pounder guns were put out of action, fires broke out in several places, the steering gear was temporarily disabled, and several officers and men were killed and wounded. In a quarter of an hour the fight had culminated, and the *Varyag* had been beaten. At the end of that time (0.5) both *Varyag* and *Asama* were turning to starboard, as also probably was the *Chiyoda*, but the *Nanika* and *Niitaka* were steering a straight course with all their port guns in action at constantly varying ranges of not less than about 5000 yards. After the *Asama* had turned sixteen points (0.15), it was seen that the *Varyag* was in difficulties. Not being under control of her helm, she had to go astern to avoid grounding on Yodolmi Island. The *Asama* and *Chiyoda*, followed by the other ships, now chased, and the range decreased rapidly, until the *Varyag* getting clear of the island stood for Chemulpo. It was during this time that she was struck on the port side about two feet above the water-line by one, if not two, 8-inch shell. Through the large hole thus made, water entered and gave the ship a heavy list to port. The *Asama* continued the chase until about 0.45, when the last shot was fired. The other Japanese ships did not pass Yodolmi. The minimum range is said to have been 4800 yards. The two Russian ships anchored off Chemulpo about 1 P.M. The Japanese squadron returned to the anchorage off Phillip Island.

The *Varyag* had been beaten and almost completely disabled, since all her guns, except 2 6-inch, had been put out of action. Her casualties were 31 killed, 91 seriously, and upwards of 100 slightly wounded. The ship was seriously on fire, and had a heavy list to port, but her defeat was complete before her stability was compromised. After removing the crew the Kingston valves were opened, and the ship sank shortly after 4 P.M. The *Koreetz* was blown up at 4.30 P.M. The *Varyag* fired 425 6-inch, 470 12-pounder, and 210 3-pounder shell, whilst the *Koreetz* fired 49 all told. Neither ship made a single hit, and as their shell did not burst on striking the water, there were no dangerous fragments. The Japanese fired 28 8-inch, and 248 6-inch and 4.7-inch, and are said to have hit direct

CHEMULPHO ANCHORAGE

Var 4430

Station Line
S. of Station Line

V. II. 40

V. II. 50

A ASAMA
C CHIYODA
N₁ NANIWA
N₂ NIITAKA
T TAKACHIMO
A₁ AKASHI
V VARYAG
K KOREETZ

BRICHY I

At N. N. A. 40
A II. 50

N. 20 1000 YDS.

Islands (20)

V. 00

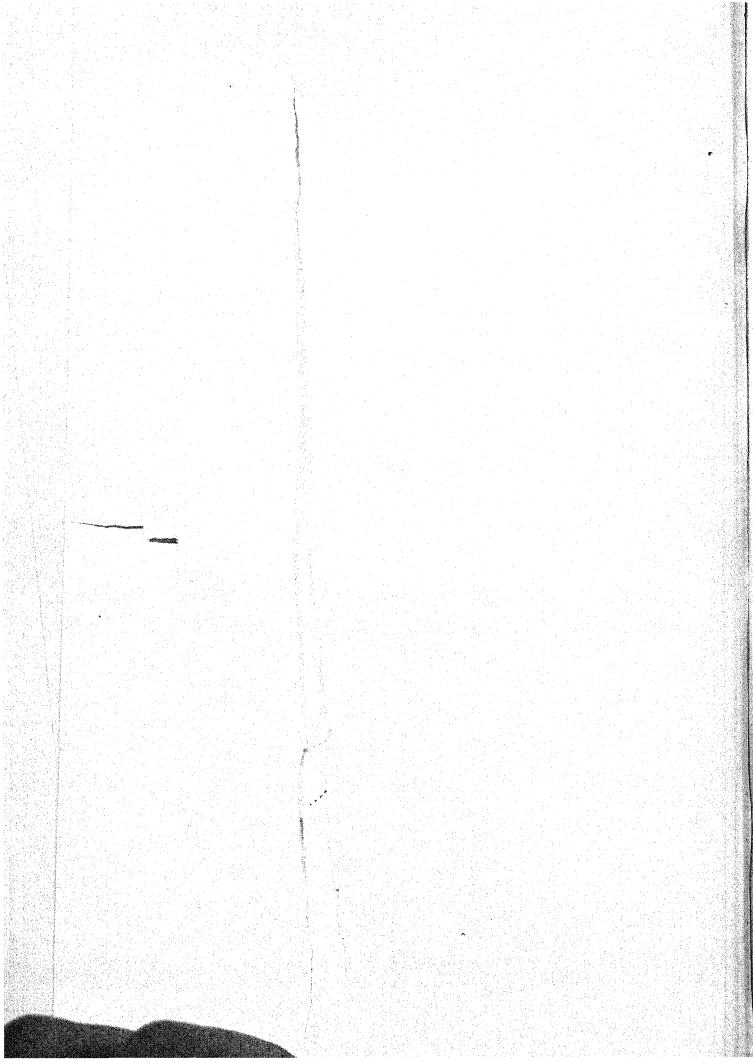
V. 00

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2 Weeks
500 YDS

10 5 0
Fathom

YONG HING DO



with 3 8-inch, and 8 6-inch or 4.7-inch shell—i.e., 10.7 and 3.2 per cent respectively. Besides these direct hits fragments from shells bursting on ricochet may have struck.

The Russian defeat was due to the greatly superior force brought against them. Not only did the Japanese bring a much larger number of guns into action, but the position assumed by the *Asama* on the bow of the *Varyag* gave them a further advantage, of which the moderate speeds and the resulting slow rate of change in the range enabled them to make full use. The armour carried by the *Asama* exercised no direct influence on the result, as that ship was not hit. An unarmoured ship could have done the work equally well. The large number of casualties in the *Varyag*, especially on her upper deck, coupled with the small number of direct hits, raises the question whether armour protection for the gun positions should be provided against fragments of bursting shell, although such may not be possible against direct hits without undue sacrifice of weight. It will be well to defer further reference to this point until the action off Ulsan has been dealt with.

THE OPERATIONS UP TO JUNE 23.

After the attacks on Port Arthur and Chemulpo the whole force came together again at Asan Bay, and Togo at once gave orders for a second raid by the second and third divisions, and two flotillas of destroyers. This force was to reconnoitre Port Arthur, to attack ships outside, and to sweep the Yellow Sea, while Rear-Admiral Uriyu covered the approaches to Chemulpo. Owing to bad weather this raid failed, and by the 16th all ships except those under Uriyu had fallen back to complete with coal and stores at a base on the south-west coast of Korea near Hako Island, some 330 miles from Port Arthur. In the Sea of Japan the Vladivostock detachment had put to sea on the 9th, and after an absence of five days had returned, having done nothing except sink one harmless merchant steamer. The orders under which they acted were so futile that their influence on the opening phase of the war was small. The

disarmament and destruction or capture of the enemy's fighting force alone tells decisively in war.

The operations during the first week of the war have been given in some detail, because in their broad features they represent the Japanese sea strategy during many succeeding weeks. Their ulterior object was to transport the army safely to the west coast of Korea and to the south coast of Manchuria. However much they may have wished a decision at sea they did not seem to seek one. Arrangements to block the exit from Port Arthur always formed part of their plan, and all their acts tended not to induce the Russians to come out but to confine them in port. Their aim being to cover from Russian attack the army transports passing up the west coast of Korea to Chemulpo and other ports, they began from a temporary base on the south-west coast of Korea a series of raids in conjunction with bombardments, torpedo attacks by destroyers, and attempts to block the exit from Port Arthur. It is important to note that these raids were made in full force. The torpedo craft and blocking ships were invariably supported at no great distance by cruisers and ships of the line. Both going and returning the Japanese did not proceed straight across the Yellow Sea, but *viâ* Hai-ju, a harbour north of Chemulpo, and some 220 miles from Port Arthur. This harbour itself in March became the advanced temporary base. Thus the fighting ships remained as long as possible near the ships they wished to cover, then they pushed straight for the enemy, who might possibly attack. During the intervals between the raids in force, detachments were sent to reconnoitre and give warning of any possible counter-stroke by the Russians. Believing it not possible at this early stage to watch the port closely, the Japanese seem to have sought not only to block its exit, but to create the mental impression that to put to sea would be hazardous.

During the first three months of war eight raids in force and five reconnaissances were made; ten attacks were delivered on Port Arthur, including five bombardments at long range, three attempts to block the exit, besides attacks by torpedo craft. The bombardments did little damage, the attempts to block the entrance failed completely, and the

attacks with torpedoes, except the first one, did no injury to any Russian ship. Out of more than thirty torpedoes, which appear to have been fired from Japanese torpedo craft during these attacks, only three hit. The number fired by the Russian destroyers is not known, but two blocking ships were each hit once while anchoring.

At the end of February a change was made in the Japanese naval dispositions. The third squadron ceased to be an independent command, and Vice-Admiral Kataoka was placed under the orders of Vice-Admiral Togo. A division from that squadron was moved up to the Ping Yang inlet to assist and cover the landing of the Guards and 2nd Army division at Chinampo, which was completed by the end of March. It may be mentioned that the 12th Army division disembarked at Chemulpo in February. A further change was made in the middle of April when the remainder of the third squadron was moved up to the same inlet to provide an escort for the 2nd Army, which was assembling there in transports. The guard of the Straits was at the same time transferred to Vice-Admiral Kamimura with a detachment from the second squadron and other ships.

On the part of the Russians, Vice-Admiral Makaroff reached Port Arthur on March the 8th, and soon wrought a change in the mental attitude of the navy at that place. The fleet passed from inertness to an activity which caused the Japanese to fear some offensive action. Makaroff began to make short sorties, and was evidently not a man to be kept in harbour by futile bombardments and attempts to block the exit. This suggested to the Japanese the idea of laying mines outside the port, which was done on the 12th of April. On the following day the Russian flagship *Petrovsk* was destroyed by one of these mines, and the *Pobyeda* was damaged by another. Vice-Admiral Makaroff perished with his ship.

At the beginning of May the Japanese forced the passage of the Yalu, the naval base was moved forward to the Elliot Islands, the 2nd Army under General Baron Oku was transported to Yentai Bay, some sixty miles east of Port Arthur, and towards the middle of the month the leading division of the 4th Army was put on shore near Taku Shan, some

forty miles west of the Yalu. On the 26th General Oku stormed the Nanshan position, cut off the Russian Port Arthur Army from the north and forced it back into the Kuang-tung Peninsula. Leaving two divisions to contain the defeated Russians, he now advanced north. His further operations do not concern us. The force left behind became the 3rd Army under General Nogi, and remained quiescent, awaiting reinforcements, until June the 25th.

As soon as the naval base was moved to the Elliot Islands the raiding system was changed for a close watch on Port Arthur. Serious Japanese losses at sea now occurred in quick succession. Two ships of the line—the *Hatsuse* and *Yashima*—a despatch boat, a destroyer, and a torpedo-boat, were blown up by Russian mines; two cruisers—the *Yoshino* and *Oshima*—were sunk by collisions with other Japanese ships; the despatch boat *Tatsuta*, with survivors from the *Hatsuse*, ran ashore off the Elliott Islands and was with difficulty salvaged eventually. Nothing further of importance took place until the sortie of the Russian squadron on June the 23rd. In the interval the Japanese maintained a close watch, mined the sea approaches to Port Arthur to hinder a sortie by the enemy, but stood prepared to resist any attempt to break out. The Russians pushed on the repairs of their ships, diligently swept the approaches for mines, and debated what they should do. The failure of the Russian land batteries to prevent the Japanese laying mines at night in the area close off the port merits particular attention. Admiral Vitgeft's report says they failed to do so even within two miles. That area could only be denied to the mine layers and their attendant escort by fighting and driving them off. For this service the Russian destroyers were used, but they were too few in numbers, and were at a disadvantage in this work since they were armed with only one 12-pounder and three or five 3-pounders as against the two 12-pounders¹ and four 6-pounders carried by those of Japan. The destroyer had found its true rôle—that for which it was designed—viz., to control the inshore area. Its gun armament was here found to be more important than

¹ One 12-pounder was substituted for one 6-pounder during 1904.

its torpedo equipment. It is interesting to note that the destroyer was originally intended to carry only guns. The loss of gun power caused by adding torpedoes can be seen by considering the weights for the original 30-knot boat—

Gun armament	8.5 tons.
Torpedo „	4.0 tons.

This indicates that by omitting the torpedoes, two 12-pounders and six 6-pounders could have been carried instead of one 12-pounder and five 6-pounders, which means that the broadside would have been stronger by one 12-pounder.

DESTROYER ACTIONS.

Three actions between destroyers merit attention.

The action on the night of March the 9th between the Japanese first flotilla—four in all—and an equal number of Russians was very confused, lasted about twenty minutes, and was fought at times at very close range and on parallel courses, but without any decisive result. One Japanese destroyer was not engaged; another had one killed and three wounded, but was hit neither in any vital spot nor near the water-line; the third had one killed and three wounded, two guns disabled, and her speed reduced to ten knots by holes due to hits near the water-line; the fourth had five killed and two wounded, one gun disabled, and her speed much reduced by injury to her auxiliary steam-pipe. The Russian loss is said to have been two killed and twenty-two wounded. Further details are lacking.

On March the 10th, about 7 A.M., the Japanese third flotilla—*Usukumo*, *Shinonome*, *Sazanami*, and *Akebono*—was about nine miles south by west of Port Arthur, and heading about west in single line ahead in the order named, when they sighted to the south-south-east about two miles the *Ryeshitelni* and *Stereguschi* also in line ahead steering for Port Arthur. The Japanese went on full speed and turned in succession to cut them off. Whereupon the Russians turned in succession and made off to the south-east. The

Japanese opened fire, and presently the Russians turned in succession to the north-westward. At 7.25 the Japanese turned together eight points to starboard, and two minutes later again turned eight points to starboard. This brought the two flotillas on parallel courses steering about north-west with the *Ryeshitelni* before the beam of the *Akebono* who was leading. Course was gradually altered to the northward for Port Arthur, and the range decreased to about 300 yards. At 7.41 the *Akebono* put her helm aport, quitted the line, and re-entered it astern of the *Shinonome*. The *Ryeshitelni* gradually drew ahead and reached the protection of the batteries. At 8.5 the *Stereguschi* was silenced and stopped. She had suffered heavy loss and had been very severely handled, but did not founder until 10 A.M. Such was the demoralisation of the survivors that they jumped overboard and swam to the Japanese ship when she approached to take possession. The Japanese losses were—

	No. of hits.	Killed.	Wounded.
<i>Akebono</i>	27	1	3
<i>Sazanami</i>	6	1	1
<i>Shinonome</i>	7 or 8	1	1
<i>Usukumo</i>	nil.	...	...

No ship was damaged in either her steaming or fighting power.

At 5.50 A.M. on April the 13th the second flotilla—*Ikadzuchi*, *Oboro*, *Inadzuma*, and *Akebono*—sighted an enemy's destroyer, the *Strashni*, returning to Port Arthur. The Japanese formed single line ahead and shaped course west to cut her off. At 6.15 the range was about 1300 yards, and both sides opened fire. The Russian bore away to port, and the action was fought on parallel courses at a range of about 1100 yards. The *Strashni* fired one torpedo which missed. At 6.25 her fire was silenced and she stopped, but did not founder until 7 A.M. The Japanese had sixteen guns in action, fired 740 rounds, and had seven wounded.

These actions confirm previous war experience that—

1. The effective way to use the gun is to get on a course parallel to the enemy at a nearly constant range.

2. Unarmoured ships are usually beaten before their floating power and stability are destroyed.
3. Superior gun fire covers its possessor from serious loss.
4. Men will stand up to their guns without armour protection.

THE SORTIE ON THE 23RD OF JUNE.

The loss of Admiral Makaroff removed the only true leader and was severely felt. On his death Vice-Admiral Skruidlov was appointed to succeed him, but was unable to reach Port Arthur. The command fell to Rear-Admiral Vitgeft, the same officer who, before the war began, had given the opinion that the Russian fleet could not be beaten. His position was extremely difficult. He had succeeded to the command of a fleet already discredited and not in a fit state to put to sea. Not only had several ships been seriously injured, but some had been partially disarmed, more especially the *Sevastopol*, who was short of one 12-inch, and the *Pobyeda*, who had landed eight 6-inch guns. The land front of Port Arthur was so unprepared against attack that, under orders from Vice-Admiral Alexieff, there had been landed from the fleet for its defence 600 officers and men with twenty-two 6-inch, seven 4.7-inch, forty-two 12-pounder, and ninety-six smaller guns. But his greatest misfortune was that he considered himself, in his own words, to be "not sufficiently equipped for such responsible duty as devolved on me so unexpectedly and so quickly in such unusual circumstances." After several Councils of War, and much hesitation, he was induced, under direct orders from the Viceroy, to put to sea. His report says that his intention was to steam out to sea beyond the range of destroyer attack, to remain somewhere in the Yellow Sea or Gulf of Pechili during the night, and the next day to seek out and attack the Japanese, who were believed to be weaker than his own force.

What were the strengths of the two naval forces in and off Port Arthur? Neither side knew exactly. Vitgeft could not tell what Japanese ships were present, and Togo did

not know whether the damaged Russian ships had been, or could be, repaired. When the fleets met, Vitgeft had six ships of the line whose united broadsides were:—

12-inch.	10-inch.	6-inch.
15	8	28 = 51 guns,

together with four heavy cruisers, whose united broadsides were:—

8-inch.	6-inch.
2	18 = 20 guns,

besides a small cruiser and a few destroyers.

Togo's force was eight ships of the line, whose united broadsides were:—

12-inch.	10-inch.	8-inch.	6-inch.
16	1	14	53 = 84 guns,

but two of these with twenty-one guns were attached to cruiser divisions and not in the line on this occasion. He had also twelve cruisers, whose united broadsides were:—

12-inch.	8-inch.	6-inch.	4.7-inch.
7	6	11	47 = 73 guns,

besides five flotillas of destroyers and nine groups of torpedo-boats.

The Japanese had such a superiority of force that the result of a general action should not have been doubtful, in view of their superior leadership, higher spirit, better discipline, and greater efficiency. But they had no confidence that they could win without suffering such loss that they would be unable to meet the Baltic fleet. Was not the immense advantage to be gained by destroying Vitgeft's fleet worth the moderate risk involved?

At 4 A.M., on the 23rd of June, the Russian ships began to move out of harbour, but were much impeded by the presence of mines laid by the Japanese in the outer anchorage during the same and previous nights. It was not until 8 A.M. that all were out, and nearly six hours later before the fleet proceeded slowly to sea, preceded by a mine-sweep-

ing flotilla, which was not sent back until 4.30 P.M. At 5 o'clock the fleet was clear and proceeded in single line ahead, course S.20 E.

On the night of the 22nd-23rd the Japanese watch off the port consisted of an inshore force of destroyers and torpedo-boats supported by detachments of cruisers some miles farther out. Togo, with the main force, was at the Elliot Island base some sixty miles away. At daylight the inshore flotilla observed the Russian ships coming out, and reported to the cruiser Admiral off Encounter Rock, who informed Togo. Before 10 A.M. all the Japanese ships had left the base. It was not until nearly 6 P.M. that Togo sighted the Russian fleet, then some eight miles northwest of Encounter Rock. He had his whole force in hand and placed it across the path of the Russian fleet to bar their further progress to the open sea. Vitgeft declined to engage, and about 7 P.M. altered course to return to Port Arthur. The reasons he gives are the lateness of the hour, the superior strength of the enemy, and the much larger number of Japanese torpedo craft. The Japanese, by laying mines and impeding the exit of the Russians, had deprived themselves of the opportunity to win victory. The sun set that day at 7.30, but the Russian fleet did not anchor in the outer roads until some two hours later, when the *Sevastopol* struck a mine and was damaged. Torpedo nets were got out after anchoring. As soon as it was dark, and some time before the Russian ships anchored, the Japanese destroyers and torpedo-boats began to attack and continued to do so throughout the night. Fourteen destroyers and sixteen torpedo-boats attacked, several of them more than once. In their tubes were seventy-six torpedoes, so that probably from sixty to seventy were fired. Not a single Russian ship was injured in any way. The only vessel damaged by a Whitehead torpedo was the Japanese torpedo-boat *Chidori*. No other vessel is known to have been struck. The Russian guns, of which all natures were used, were nearly as ineffective. Only one Japanese destroyer and three torpedo-boats were struck, while only three men were killed and five wounded. The failure of

the Whitehead torpedo was complete. Was this due to inefficiency in the weapon, or to an improper method of using it? To what was the failure of the gun due? Was the gun improperly used? May it be that attacks at high speeds on opposite courses, or underhelm, do not give proper opportunities either to the torpedo or to the gun?

But a more important question remains. The Japanese blocking and mining operations show that their aim was to confine the Russian ships in Port Arthur. As this sortie proved, these operations had failed. The policy had involved the following losses on either side up to the 23rd of June:—

	<i>Russia.</i>	<i>Japan.</i>
Ships of the line.	Petropavlovsk.	Hatsuse. Yashima.
Cruisers.	Varyag. Bogatyr. Boyarin.	Yoshino. Oshima.
Small craft, &c.	Koreetz. Yenisei. Mandjur. ¹	Miyako. Akagi.
Torpedo craft.	Vnushitelni. Stereaguschi. Strashni. Vnimatelmi.	Akatsuki. No. 48.

¹ Interned.

Were not the risks involved in the Japanese policy greater than those likely to be incurred in a general action?

The Russian fleet was still a menace, and would remain so until it was destroyed. Nevertheless, Togo did not seek to draw it out to sea with a view to its destruction, but drove it back into port. Was his action due to the fear that the Russians might escape him and reach Vladivostock or perhaps a neutral port? was he influenced by concern for the communications of the Army, or perhaps by undue regard for the safety of his ships? We do not know, and can only judge by the results. It is important to note that the policy adopted did not seek to induce the enemy to come out

with a view to the decision in which alone true safety was to be found. What policy are we going to adopt in the next war? Shall we have any choice? May not the enemy have something to say to that? Does not the close watch of the enemy in port belong to that stage in the war when one side has established some superiority at sea? What is to be the policy before any superiority has been established?

VI.

THE BATTLES OF THE
10TH OF AUGUST AND OF ULSAN.¹

Note.—The times are local mean time—*i.e.*, fifty-five minutes are deducted from the Central Japanese time (135°) kept by their ships during the war. The courses and compass bearings are magnetic.

THREE days after the sortie of the Russian fleet on the 23rd of June General Nogi captured the advanced positions held by their army in the Kuang Tung Peninsula. One month later, having been reinforced, he attacked their whole line, and drove them back on the defences of Port Arthur. On the 7th of August the land attack on that fortress began. Forty-eight hours later two important outlying positions were captured, and the ships in harbour were reached and damaged by artillery fire, the *Retvisan* especially being hit by seven shells, including one which is said to have let in 400 tons of water. What was Admiral Vitgeft now to do? Since the sortie several telegrams had passed between him and the Viceroy. The Admiral, fortified by the opinion of more than one council of war, held that he could not hope to reach Vladivostock without fighting an action, which he could not expect to win, and that the best way to use the fleet was to remain in harbour and assist to defend Port Arthur to the last. He had no conception that the Russian cause would have been best aided by inflicting damage on the Japanese fleet. The Viceroy—Alexieff,—backed by the Czar, held up the *Varyag* as an example to be followed, and directed him to proceed to Vladivostock. The Admiral had no option but to obey. But on August the 10th, when

¹ Read on the 2nd of June 1911.

about to sail, he sent, by the *Ryeshitelni* to Chifu, the following telegram to the Emperor :—

In compliance with the commands of Your Majesty, transmitted to me by the Viceroy in a telegram, I am steaming out with the squadron in order to break through to Vladivostock. I, personally, and a conference of Flag Officers and Captains, after taking into consideration all the local conditions, were adverse to this sortie, which, in our opinion, cannot meet with success, and will hasten the capitulation of Port Arthur, which I have reported time after time to the Viceroy.

Here was no intention to destroy the enemy or perish in the attempt, but only to avoid action. It is evident that a man holding such views as his was already half beaten before he sailed.

Having re-embarked guns landed for the defence of Port Arthur, except one 12-inch, ten 6-inch, and twelve 12-pounder, the Russian ships began to go out of harbour before daylight on the 10th of August. By 9 A.M. they were moving slowly to sea in single line ahead, preceded by a mine-sweeping flotilla in line abreast. The squadron consisted of six ships of the line and three cruisers, besides the *Novik* and eight destroyers—see Table IX. Six other destroyers escorted it through the mine-strewn area, and then returned to Port Arthur with the mine-sweeping flotilla. By 10.30 A.M. the squadron was clear of mines, and shaped a south-easterly course at a speed at first of eight and presently of ten knots. The ships were in single line ahead in the order, *Tsesarevitch*, *Retvisan*, *Pobyeda*, *Peresvyet*, *Sevastopol*, *Poltava*, *Askold*, *Pallada*, *Diana*. The *Novik* with destroyers was ahead. Rear-Admiral Vitgeft had his flag in the *Tsesarevitch*, that of Prince Ukhtomski flew in the *Peresvyet*, and Rear-Admiral Reitzenstein was on board the *Askold*. The day was fine, with light airs from the southward and a low-lying mist, which at first limited the view to seven or eight miles.

The Japanese force available, and its disposition at day-break on August the 10th, are shown in Table X.

It will be seen that the port was watched by an inshore force of three destroyer flotillas and four torpedo-boat groups,

supported by three cruiser divisions off Liao-ti-Shan, Encounter Rock, and Sho-hei-to respectively, and backed by ships of the line some twenty miles farther to the rear. The destroyer and torpedo-boat base was at Dalny some twenty-five to thirty miles distant from the inshore watching line. The Russians had six ships of the line, whose united broadsides numbered fifty-two, against the same number of Japanese with sixty-three guns, which were raised to seventy-three when the *Yakumo* took post in the line. In cruisers the Russians had only four with twenty-one guns against nine Japanese with fifty-five. Neither the *Asama* nor the *Idzumi* are included, as they did not join until the afternoon.

Shortly after daybreak intelligence that Admiral Vitgeft was putting to sea reached Admiral Togo, who was then off Round Island, but at 9 A.M. seems to have stood to the westward. At 11.5 he was about three miles south-east by east of Encounter Rock with the first division in single line ahead steering west south-west. The speed is doubtful, but was made twelve knots at some uncertain time. The ships were in the following order: *Mikasa*, *Asahi*, *Fuji*, *Shikishima*, *Kasuga*, and *Nisshin*. Admiral Togo had his flag in the *Mikasa*, that of Rear-Admiral Nashiba was in the *Shikishima*, and Vice-Admiral Kataoka was on board the *Nisshin*. Shortly after 11.30 the Russian squadron was sighted about W. by N. distant some thirteen miles. Each squadron was two to three points on the bow of the other. What was Admiral Togo now to do? Was he to close to decisive ranges? or to fight a long-range action? Two ships of the line were absent—the *Yakumo* was with the third division, and was being used as a cruiser; the *Asama* was on her way back from the Elliot Islands where she had gone to coal. The Japanese policy throughout the war was not to risk their ships. Actuated probably by that idea, Admiral Togo chose long range, and about 11.45 turned the division together four points to port, thus leaving Vitgeft free to do as he pleased. Had he closed as soon as the enemy was sighted, either in line of bearing or in line ahead and turning up as at Tsu Shima, he would have approached the Russians on their bow, and apparently would have been able to reach decisive ranges in time to find them just proceed-

ing at 12 to 13 knots after having stopped at 11.50 for about ten minutes to repair the steering gear of the flagship—*Tsesarevitch*. In that case he would probably have controlled not only the range, but Vitgeft's movements, and have compelled him to turn to starboard. Reverting to the actual facts. About 11.55 Togo turned together back again into line ahead. At 0.4, having crossed the Russian track and wishing to draw them out to sea, he turned together eight points to port, which brought him into line abreast steering S.S.E., but left the enemy free to turn in any direction he pleased. If Togo wished to draw the enemy farther from their port, should he not have remained on their bow ready to close? Was it not a mistake to cross the T? On this course he stood on until about 0.15, when, seeing that the Russians were bearing away to the eastward, he turned together eight points to port, which brought him into line ahead inverted, steering E.N.E. About 0.20 one or two ships on either side began a very slow fire with their 12-inch guns at a range of about 14,000 yards. About 0.22 the Japanese altered course in succession to N.E. About the same time the Russians, whose then course is not exactly known, but has been taken as east, reduced speed to dead slow—say 6 knots—to permit the *Pobyeda* to regain station after a mishap with her steering gear.

About 0.30 the *Tsesarevitch* seems to have had the *Nisshin* about four points on the bow, and to have been herself nearly on that ship's beam, the range being rather more than 13,000 yards. Under the influence of the idea that the Japanese sixth division and destroyers, then ahead of him, were dropping drifting mines¹ in his path, Vitgeft now turned in succession an uncertain number of points to starboard, and at some uncertain time went on 12 to 13 knots. To meet the threatened attack on his rear and "desiring to cross the T," Togo turned together sixteen points to starboard at about 0.40, and increased speed to 14 knots. His course was now S.W. and across the path of the advancing Russians, who were again free to turn either way. Vitgeft did not wish to fight a decisive action, and therefore did not steer in the same direction as Togo, but turned off to

¹ They were really coal bags or baskets.

port in succession about 0.45, and at the same time the Japanese began to bear away in succession to starboard. Thus it happened that about 0.54 the two squadrons began to steam past each other in opposite directions at a range of rather more than 7000 yards. The speed of the Russians was now about 12, and that of the Japanese about 14 knots. Up to this time only primary guns had been in action at long and in general rapidly changing ranges. The fire had been almost entirely ineffective. Now a few hits were made, and the secondary batteries joined in, but still the conditions were not favourable to the effective use of the guns. No decisive results have ever been obtained when ships or fleets pass each other rapidly on opposite courses.

The Russians soon bore away gradually in succession to the south-eastward. The further movements of the Japanese cannot be set forth with any certainty. Togo says:—

. . . We gradually turned to the north, enveloping the enemy. The Russian cruisers now took station on the off-side of their battleships. . . . The first division, therefore, turned to starboard with the intention of cutting them off, but a little time was wasted and the intention could not be carried out, so we took a parallel course to the enemy.

Semenoff, who was in the *Diana*, the Russian rear ship, says:—

. . . The enemy turned about sixteen points, approached us to about 6000 yards, and then steamed away. It was an exciting moment, especially when the Japanese squadron turned short across our rear and concentrated its whole fire on our three cruisers at the end of the line, without our battleships being able to reply to it. . . . The sea was boiling all round our rear ships. . . . *Askold* signalled to cruisers: "Increase speed." "Turn to port." They speedily got out of their unpleasant position. The *Diana* was not hit direct. Her sides, boats, &c., were riddled by small splinters, but only two men were wounded. The *Askold's* fore funnel and *Pallada's* starboard cutter were each hit, but those ships lost no men, and were not seriously damaged.

Another account says the *Askold* lost one officer. It is evident that the Japanese turned to starboard in succession, to cross the tail of the Russian line, and poured their whole

fire into the three cruisers stationed there, without producing any effect. Nevertheless, those ships left the line and took station to port of the battleships. The incident shows that it is futile to pass an enemy on opposite courses or to attempt to cross his rear. Finally, and this is the material point, Admiral Togo found himself at 1.30 on the starboard quarter of the Russians, steaming 14 knots to their 13 on a course parallel to them, their nearest ship more than 10,000 yards distant, and the *Tsesarevitch* nearly out of sight. So far the losses had been insignificant. The Japanese official account admits a loss on board the *Mikasa* of 8 killed and 5 wounded caused by 1 shell; in the *Nisshin* of 3 killed and 13 wounded due to 2 shells; on board the *Asahi* of 1 wounded. The Russian loss up to this time is not known exactly, but is believed to have been equally trivial. The action had been indecisive. Vitgeft would not risk an action with the 20 per cent superiority of force against him. Togo had passed from a superior tactical position on the bow of the enemy to an inferior one on his quarter, and was not eager for close action. But war cannot be made without taking risks. What was now to be done? If there be any temporary advantage in pressing on the head of the advancing Japanese line, Vitgeft was now in a position to do so. He did not avail himself of the opportunity, and Togo had to fall back on his superior speed to make good his tactical blunder. Both fleets continued to steam on parallel courses and to exchange shots at very long range. The Japanese gradually crept up until their van was nearly abreast the Russian rear, when, finding that the *Mikasa* was being hit repeatedly (three times in a quarter of an hour), and would be exposed to the fire of the whole Russian squadron as she slowly forged past, he edged away out of range to the southward, and about 2.37 increased to 15 knots. About 2.30 all firing ceased, after having been maintained for upwards of two hours.

By about 3.30 the Japanese had advanced so far that they could again close, which they did. By 4.40 the distance between the leading ships had been reduced to about 7600 yards, and the firing recommenced. At this time

the general position was as follows: a light breeze blew from the north-west and the sea was calm. The Russians were steaming about 13 knots on a course not exactly known, but speaking generally in a south-easterly direction. Their rear ships were somewhat strung out, the *Poltava* especially being at least a mile astern of station, unsupported, and much exposed, which shows that an admiral's chief care should be for his rear ships when retreating. Their cruisers were 4000 yards distant on the off side instead of being ahead. Thus seventeen effective guns were not in action and not available, if any opportunity offered against the *Mikasa*. The Japanese were going 15 knots on an approximately parallel course. The first division appear to have been well closed up. The third had come up, and the *Yakumo* was just taking station in the line, or rather a little to port of it; but the other three ships of the division, like the Russian cruisers, remained on the off side of the ships in the line, and thus their twenty-one guns were not in action. The sixth was not far astern of the third; the fifth was some ten miles away in the north-west quarter; the *Asama*, the destroyers, and torpedo-boats were some ten miles astern and coming up. The action which now followed was a long-range fight between two squadrons steaming on parallel lines. Under such conditions the Japanese two knots superiority of speed gave them a very limited control over the range. This has been already explained at length,¹ and need not now be dwelt on. It will suffice to say that the freedom left to the slow squadron to bear away, the need to keep all guns in action, the danger of exposing the van or rear of either fleet to attack by superior numbers, introduces limitations in the courses which make changes in the range slow. Thus the range at which ships are turned up to bring their broadsides into action is the chief factor in determining that at which an action is fought. An admiral bent on fighting at a decisive range will try to reach it as quickly as possible. The manner in which he will approach and the range at which he will turn up are nice questions, only to be decided at the time according to the conditions, of which the chief is the distance at which the enemy may be expected

¹ See *Naval Policy* by "Barfleur," Blackwood & Sons.

YESAREVITCH - T
 RETVISAN
 POBYEDA
 PERESVYET
 SEVASTOPOL
 POLTAVA
 AKROLD
 PALLADA
 DIANA

YELLOW SEA AUGUST 10 (APPROXIMATE)

MIRAL - M
 ARAHI
 FUKU
 SHIKISHIMA
 KALOUA
 NISSHIN - N

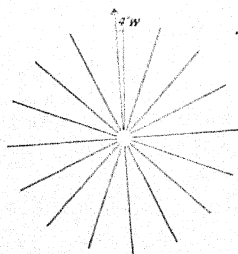
T. 11.30

T. 0.0

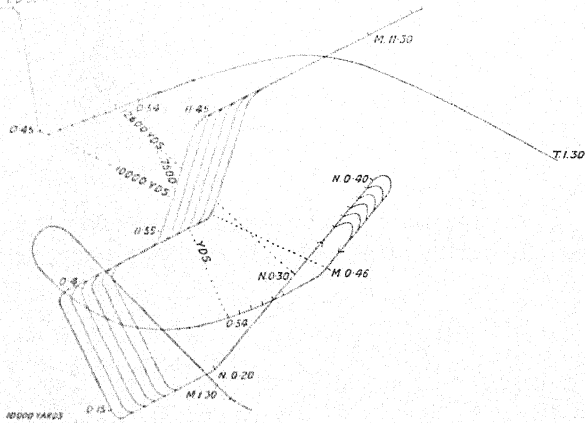
T. 0.30

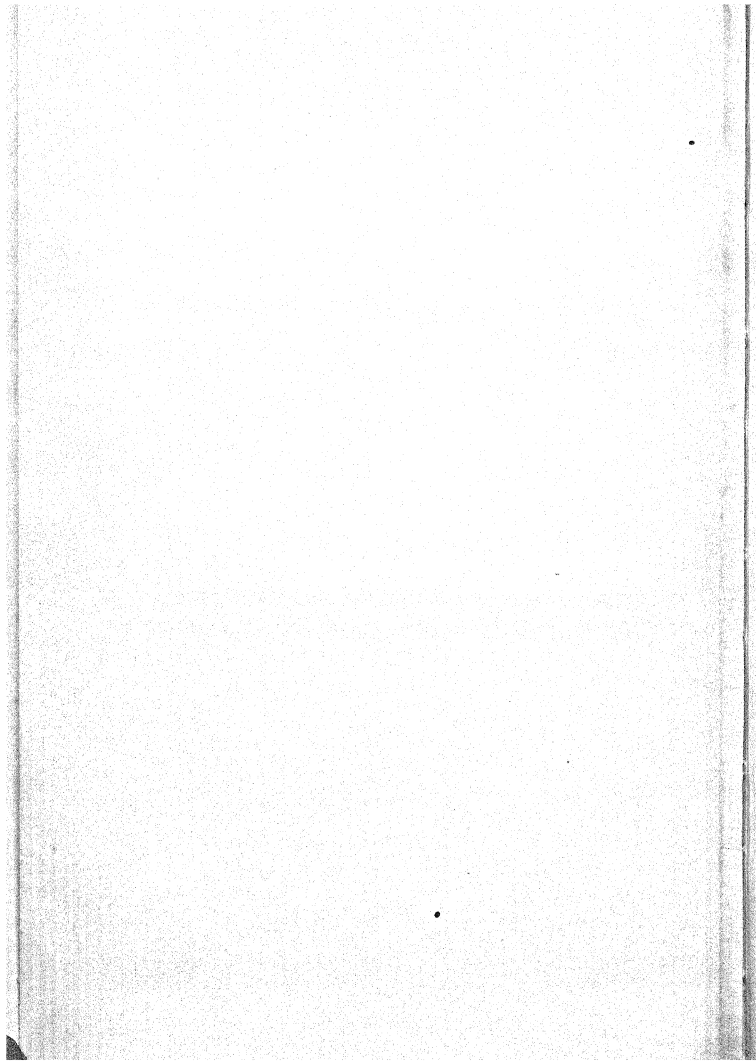
M. 11.30

T. 1.30



20 10 0 2 4 6 8 10000 YARDS





to hit so often that his fire must be beaten down. Togo did not make use of his opportunity in the forenoon, and, as Vitgeft was bent on running away and not on fighting, was never able to reach the decisive range at which his superior gun fire would have enabled him to beat down quickly that of the enemy. He had to risk the danger of chance hits during a prolonged action at long ranges.

The two squadrons fired at each other for an hour at a gradually decreasing range without any decisive results. At first, according to the Japanese official account, two ships—the *Mikasa* and *Fuji*—fired at the *Tsesarevitch*, while the other four and the *Yakumo* engaged the *Poltava*. But soon the targets were changed, which appears to have been frequently done during the action. This seems to have been a mistake. There would have been a better chance of hitting if each ship had "taken her own bird" and kept to it, since there is a falling off in accuracy when more than two ships fire at the same enemy, and the ranges of the various enemy ships differ little when two small squadrons are in parallel lines at such long distances apart. Again, under such conditions, no enemy should be left unfired on. It is not yet known on what enemy ships the Russians directed their fire.

Up to the end of the first hour no decisive advantage had been gained by either side. Then the two leaders began to suffer. The *Mikasa* had now been struck by at least twelve projectiles, and had suffered a loss of at least 19 killed and 58 wounded during the day. Her after-turret was out of action. The *Tsesarevitch* had suffered no such loss and her armament was still intact, when about 5.40, two 12-inch shells struck the foremast and conning-tower respectively, killing the Admiral besides several officers and men, and wounding others, including those inside the conning-tower, and throwing the helm over to starboard. The losses in the other Japanese ships had been trifling. It is true that one gun in the fore-turret of the *Shikishima* had been disabled and was out of action, as also was the after-turret of the *Asahi*, but in neither case was this due to the enemy's fire. The casualties in the remaining Russian ships at this time are not known, but they cannot have been

serious. The *Retvisan's* fore-turret and possibly also the *Peresvyet's* were out of action. The former was hit by a shell which burst on the edge of the gun port, and injured every one inside; the latter was struck by two shells, of which one jammed the turret and the other entered the port and disabled the whole of the crew. The jamming of the *Tsesarevitch's* helm a-starboard caused her to turn to port, and threw the whole Russian line into confusion. This was the culminating point in the battle. The ships turned different ways, but finally bore away to the north-west. The Japanese were able to close, and to pour in their fire at ranges varying from 3800 to 5500 yards. The Russians were only saved from total destruction by the approach of sunset, which was at 6.50. It is not necessary to dwell on the further movements. The great tactical lessons are:

- (1) That crossing the T is not necessarily always effective, since the enemy's movements are not controlled by doing so, and the conditions are not usually favourable to hitting.
- (2) The mistake of wasting time at "long bowls."
- (3) The risk from chance hits during a prolonged action at long range.

The wiser course now, as in the past, is to close in to decisive ranges, at which the enemy's movements can be controlled and his fire dominated, and to remain there, keeping him under the fire of your own guns until he surrenders or is destroyed. "No officer can do very wrong who keeps his guns bearing on the enemy." Togo had an opportunity to do this when the fleets first met, but did not seize it, and not only risked defeat, but failed to destroy the Russians after defeating them. The ships that escaped and returned to Port Arthur landed guns, ammunition, and upwards of 2000 men, who materially strengthened its defences. The results were that 60,000 Japanese soldiers were disabled before that fortress, and the Japanese armies were weakened in the great land battles. At the battle of Tsushima in the following May, the Admiral showed that the lesson had been taken to heart.

The six Russian ships of the line fired about 3400 rounds

from their barbette and 6-inch guns. As far as is known, and omitting hits on masts, yards, and rigging, except one on the main-top of the *Mikasa* which disabled ten men, the Japanese ships were struck by only thirty-two projectiles from guns of these natures, by two smaller ones, and by fragments of nine others which burst on striking the water. This gives about 1 per cent of actual hits to rounds fired, which is to be compared with the 5 per cent of the Chinese 12-inch guns at the Yalu and the 3.2 per cent of the American 4-inch guns and above off Santiago. Of these thirty-two hits, twenty-two struck the *Mikasa*. Not quite ten per cent hit near the water-line, which is nearly the same as in the case of the Japanese ships at the Yalu and the Spanish ships off Santiago. The hits on the gun positions were also about ten per cent of the total hits made. The armour on the gun positions is believed to have stopped only one direct hit and fragments of two others. One-half the hits caused no casualties, and of the remainder the average number due to each 12-inch or 10-inch was about the same as that due to each 6-inch.

The six Japanese ships in the line and the *Yakumo* fired nearly 5000 projectiles, or about 40 per cent more than the number fired by the Russians. The number and position of the hits on the Russian ships are not known with any accuracy, but such information as is available indicates that the Japanese percentage of hits to rounds did not exceed 6 or 7 per cent. The number of hits near the water-line was less than 10 per cent of the total hits, as also was the number of direct hits on the gun positions. Of the primary gun positions:—

Six were not hit;

One was hit only on the roof;

Three were hit and saved by vertical armour;

Two were hit and put out of action.

Thus the vertical armour saved only 25 per cent of the Russian and none of the Japanese primary gun positions from direct blows. We have to remember that the armour of these primary gun positions absorbs as much weight as the guns, mountings, and ammunition. It is also to be

noted that a 10-inch gun in the *Peresvyet* was put out of action by a very small projectile (6-pounder) which struck the chase and bulged the bore.

One other remark is necessary. The fight culminated with a single blow, but it was not one of the kind we have hitherto considered. It inflicted no vital injury on the *Tsesarevitch*, but its results upset the unstable mental equilibrium of those in charge of the other Russian ships. The losses were :—

<i>Japanese.</i>			<i>Russian.</i>		
	Killed.	Wounded.		Killed.	Wounded.
Mikasa	32	93	Tsesarevitch	13	50
Asahi	...	2	Retvisan	6	43
Fuji	...	...	Pobyeda	3	48
Shikishima	...	...	Peresvyet	13	77
Nisshin	16	16	Sevastopol	1	63
Kasuga	...	11	Poltava	12	43
Yakumo	10	12	Askold	11	48
Other ships	10	34	Pallada	4	5
			Diana	9	20
			Novik	2	7

The only proceedings after the battle which bear on our subject are the attacks made during the night by the Japanese destroyers and torpedo-boats on the scattered Russian ships.

Before sunset the *Askold* and *Novik* had already gone off to the southward; the former went to Shanghai, the latter after looking in at Kiao-chao made for Vladivostock, but was defeated and destroyed in Korsakovsk Bay in the Island of Saghalien. After dark the *Tsesarevitch* and *Diana* proceeded separately, the first to Kiao-chao, the second to Saigon. Of the destroyers one went to Shanghai, three to Kiao-chao, and one ran on shore on the coast of Shangtung. The remaining ships made for Port Arthur, but only the *Pobyeda*, *Sevastopol*, and *Peresvyet* seem to have kept together. Against these scattered and beaten ships were sent five flotillas of destroyers, seventeen in number, and seven groups of torpedo-boats, thirty-one in number. All the former, but only twenty-one of the latter, attacked, some more than once. Seeing that each destroyer had two 18-inch torpedoes in her

tubes and each torpedo-boat three of 14-inch, or ninety-seven in all, it is not extravagant to assume that some seventy to eighty were fired. The only vessel struck—presumably by a Russian torpedo—was the Japanese torpedo-boat No. 38, which did not sink but was seriously damaged and suffered a loss of one killed and eight wounded from the explosion. Not a single Russian ship was touched. The only loss from gun fire during these attacks admitted by the Japanese was nine killed on board the *Asagiri*, who was hit by two projectiles. No other hits are mentioned. The failure both of the Whitehead torpedo and of the gun was as complete as on the night of June the 23rd, when it will be remembered the only ship struck by a Whitehead was also a Japanese torpedo-boat. Again we must ask ourselves to what this failure was due. Were the weapons themselves in fault, or were they wrongly used and not given proper opportunities?

OPERATIONS IN THE JAPAN SEA.

The Vladivostock detachment now requires our attention. It will be remembered that in the Alexieff plan of 1901 this force was to act on the Japanese communications, to raid their coasts, and thus to draw away a part of their fleet from the gulfs of Korea and Pechili; that in the actual instructions given to the senior officer in January 1904, he was directed to raid the coast of Japan, to destroy shipping, lighthouses and signal stations, to sink transports, and generally create alarm. This was the original policy which had produced the armoured cruiser. How did it issue in practice?

The Sea of Japan is not very different in size and shape from the North Sea. The principal distances are:—

Tsu Shima	to Vladivostock	.	.	500 miles.
„	„ Tsugaru Straits	.	.	650 „
Vladivostock	„ Tsugaru Straits	.	.	380 „
„	„ Gensan	.	.	300 „

The Korea Straits are broader than the Straits of Dover, and are divided by the Island of Tsu Shima into two

channels—the Northern 27 miles across, and the Southern somewhat wider.

The Japanese force in the Straits at the outbreak of war consisted of the 5th and 6th cruiser divisions, the 7th mixed division besides torpedo-boats. The first two gave Vice-Admiral Kataoka, the officer in command, eight ships, whose united broadsides numbered 47 guns against four Russian ships with 40 guns. The disparity between the two, which was not great, lasted until the 17th of February, when the 6th division was sent to the Yangtse to bring about the disarming of the Russian gunboat *Mandzhur* at Shanghai. That division was absent about twelve days, and during that time Kataoka was decidedly inferior, but not more than about 200 miles away was the south-west base, where the main fleet was at intervals. The strength of the Russian detachment at Vladivostock has been already given in Table VII.

During the month of February the Russians put to sea twice. On the 9th the four ships ran across—380 miles—to the entrance of the Tsugaru Straits, and returned on the 14th, having sunk a small Japanese steamer.¹ On the 24th they went to Gensan—300 miles—and returned on the 29th, having done nothing.

At the end of February, as has been already mentioned, Kataoka was placed under the orders of Togo, and the 7th division was moved up to the north to assist the army. On the 2nd of March, Kamimura was sent with a strong detachment to make a demonstration off Vladivostock, into which he threw a few shells on the 6th; he rejoined Togo at south-west base on the 16th, leaving to Kataoka the guard of the Straits. During the six weeks following this demonstration, the Vladivostock detachment did not go more than 60 miles from home.

The death of Admiral Makaroff on the 13th of April, and its attendant results, suggested to the Japanese that the time was ripe for a second demonstration off Vladivostock. The progress of the war also called for fresh dispositions. Kamimura was sent with a strong detachment to deal with the Vladivostock ships and to hold the Straits of Korea.

¹ *Nahoura Maru*.

Kataoka with the force under his orders was moved into the Gulf of Korea to cover and assist the landing of the army in Southern Manchuria. On the 16th of April Kamimura left the north-west base and reached Gensan on the 22nd, where he completed with coal and water. His force¹ comprised five ships of the line, five cruisers, a destroyer flotilla, two groups of torpedo-boats, a special service steamer, and the *Kinshu Maru* to co-operate with the troops at Gensan against a Russian military force not far distant. He sailed on the 23rd, but ran into a fog so thick and so lasting that he returned to Gensan on the 26th to find that on the previous day the enemy had been there, and had torpedoed and sunk a small Japanese steamer² at anchor in the bay. The torpedo-boats and *Kinshu Maru* had sailed a few hours before for a port a few miles to the northward. Presently the torpedo-boats returned, and reported that they had parted company with the transport the previous evening on her way back to Gensan. What had become of the *Kinshu Maru*? She had been stopped, torpedoed, and sunk by the Russian squadron about 1.30 A.M. that morning—the 26th—some sixty miles north of Gensan. What was this Russian force? It was the *Rossiya*, *Gromoboi*, and *Bogatuir* under Rear-Admiral Jessen, who with two torpedo-boats had left Vladivostock on the 23rd, the same day on which Kamimura had sailed from Gensan. It is to be specially noted that the *Rurik* had originally left with the squadron, but had been sent back because her speed was deficient. On the 24th, the two squadrons had passed so close that they must have sighted each other but for the fog. The Russians returned to Vladivostock on the 27th, having on the previous day sunk another small Japanese steamer.³

Kamimura left Gensan on the 27th, mined the approaches to Vladivostock on the two following days, and then returned to the Straits of Korea, where he arrived on May the 2nd

¹ <i>Idzumo,</i>	<i>Adzuma,</i>	<i>Kasuga,</i>	<i>Tokiwa,</i>	<i>Iwate,</i>
<i>Naniwa,</i>	<i>Takachiho,</i>	<i>Tsushima,</i>	<i>Niitaka,</i>	<i>Chihaya.</i>
First flotilla (4).		No. 11 and 15 groups (6).		
<i>Nikko Maru,</i>	<i>Kinshu Maru.</i>			

² *Goyo Maru.*

³ The *Haginoura Maru.*

and remained with four ships of the 2nd division, and the 4th division, besides destroyers and torpedo-boats. This demonstration, like the first, reduced the Vladivostock detachment to inactivity for six weeks. The reason is instructive. Just as "Stonewall" Jackson played on the ignorance and fears of Lincoln, so did the Japanese play on those of the Russian leaders, who probably pictured to themselves Kamimura with a superior force just below the horizon, and, not being prepared to fight him, were thus induced not to go far from home. As a matter of fact he was in the Yellow Sea during the first interval, and in the Straits of Korea during the second. The whole proceedings are a fresh proof that in war the indirect effect of any particular movement on the minds of the enemy's leaders is often quite as important as the direct results.

In the month of June the Russians began to venture farther afield. Probably to create a diversion previous to the sortie from Port Arthur, which ultimately took place on the 23rd, the Vladivostock detachment suddenly appeared on the 15th in the Straits of Korea, and was sighted by the Japanese look-out ships. It was now under the command of Rear-Admiral Bezobrazov and numbered only three ships, the *Bogatuir* having been stranded on the 15th of May.

Before Kamimura could arrive on the scene, three Japanese transports had been either sunk or seriously injured. One¹ had been sunk by gun fire. Another² had been fired into and stopped, then torpedoed and sunk. The third³ had been stopped and twice torpedoed, but did not founder, and finally reached port although both torpedoes took effect. Fearing the appearance of Kamimura the Russians fled. Favoured by thick weather, they were able to avoid action, and returned to Vladivostock, which was reached on the 19th, after capturing a neutral steamer⁴ *en route*.

On the 28th of June the three ships with the armed transport *Lena* and eight torpedo-boats sailed, and two days later arrived off Gensan, where they burnt a small steamer⁵ and a sailing ship,⁶ besides doing other damage. The *Lena* and torpedo-boats, less one run ashore and destroyed, were sent back to Vladivostock. The three ships went on to the

¹ *Izumi Maru*.

⁴ *Allanton* (British).

² *Hitachi Maru*.

⁵ *Koun Maru*.

³ *Sado Maru*.

⁶ *Seisho Maru*.

Straits of Korea, which they reached late on the 1st of July. But their presence at Gensan had been reported, and Kamimura was on the look-out for them. The two squadrons sighted each other about 6.30 P.M. The Russians fled, and favoured by the approach of night were lost to sight. They reached Vladivostock on the 3rd, having captured a neutral steamer¹ the previous day.

On the 17th of July the squadron, now under Rear-Admiral Jessen, again put to sea, and at 3.30 A.M. on the 20th entered the Tsugaru Straits, through which their passage was reported. They were off Tokyo Bay some 500 miles farther south between the 22nd and 25th, when, coal running short, they started to return, passed Tsugaru Straits on the 30th, and reached Vladivostock on August the 1st. While on the east coast of Japan they had captured five steamers² and four sailing ships,³ four of the former being neutral. All were sunk except two neutrals sent into port. The steps taken by the Japanese to meet this raid did not influence the Russian movements.

THE ACTION OFF ULSAN, AUGUST THE 14TH.

Intelligence that the Port Arthur squadron had put to sea on the 10th of August reached Vladivostock on the following day. On the 12th about 8 A.M. Rear-Admiral Jessen in the *Rossiya* sailed, with the *Gromoboi* and *Rurik* in company, to meet it in the Straits of Korea, not knowing that it had been defeated and scattered. About 4.40 A.M. on the 14th Jessen reached a position about 36 miles N.-E. of Mitsu Light on the island of Tsushima, and altered course to west. The speed is not known, but was probably quite moderate, although fires were alight in all boilers. Four ships were now sighted to starboard and to the north at a distance then estimated as about eight miles, which agrees roughly with that given by the dead reckoning positions of the respective squadrons.

On the evening of the 10th Kamimura, at Ozaki in Tsushima Sound, heard of the Russian sortie from Port

¹ *Cheltenham* (British).

² *Takashima Maru*, *Arabia* (German), *Thea*, *Knight Commander*, *Calthas* (British).

³ *Kiho Maru*, *Hokusei Maru*, *Jizai Maru*, *Fukushu Maru*.

Arthur, and on the following morning learnt its result. After an excursion as far as Ross Island—210 miles—to meet Togo's ships, he found himself again in the Straits on the night of the 13th with the 2nd division in hand, and the 4th division with six groups of torpedo-boats spread to watch for Russian ships trying to pass either way through the Straits. At 1.30 A.M. on the 14th the 2nd division was in lat. 35.40 N. and long. 130.10 E. steering S.-W. by S. at a speed of $7\frac{1}{2}$ knots. At 4.25 A.M. lights were sighted on the port bow, and by 4.50 the Russian squadron could be made out steering S.S.W. The latter had already turned away from their westerly course.

The forces now in presence are shown in Table XI.

The two squadrons present a remarkable contrast, which deserves close attention.

The total displacements were the same, but three ships were pitted against four smaller ones. The total numbers of the crews—2432 to 2696—and of the guns carried—66 to 70—did not differ much, but the Russian guns were arranged so that only thirty could be used on one broadside, as against forty-three of the Japanese. Again the former had only twelve gun positions protected by armour while the latter had fifty-four. It is evident the Japanese were much superior in fighting power. The Russian squadron was slower, its sea-going speed being less than 16 knots as against the 17 knots of their opponents. On each side one ship was a knot or more slower than the others. The coal supply of the *Rossiya* and *Rurik* was larger in proportion than that of the Japanese ships.

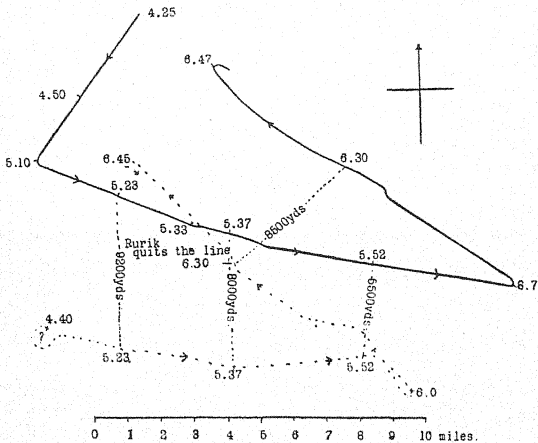
Reverting to the movements of the two opponents, whom we left at 4.50 steering to the S.S.W. or thereabouts, each in single line ahead. At 5.0 the distance apart was estimated as five to six miles (Diagram I.). According to their official report, the Russians increased speed, and continued to turn in succession to port, until they headed about N.E. by N., whence they very soon bore away again to starboard, until they steered about E. by S. The Japanese seem to have stood on until 5.10, when, seeing that the enemy were heading to the eastward, they turned in succession to E.S.E., having at some uncertain time increased speed, which by 5.30 became 17 knots. The Russian speed during the first hour

ULSAN. AUG. 14

DIAGRAM I.

Russians shown - - - -

Japanese " ———

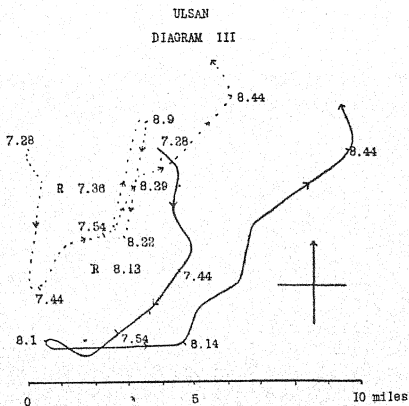


is not given, but that of the *Rossiya* and *Gromoboi* did not reach 17 knots until after 6 o'clock. The *Rurik*, being more than a knot slower, began to drop astern of station early in the action. At 5.23, both sides opened fire with their 8-inch guns at a range of about 9200 yards, which decreased to 8000 yards at 5.37, when the 6-inch guns began to join in, and to not more than 5500 yards at 5.52, when the 12-pounders were also in action.

What was the position at this time? True to the rôle which their ships had been designed and built to fill, and which they had been taught and directed to follow, 2400 Russians were seeking to avoid action with 2700 Japanese, who barred their return to Vladivostock. The Russian Admiral saw that the enemy was passing him, and that he could not hope to escape on his present course. What could be more natural than to turn round, especially as the *Rurik*, left astern and unsupported, would then be able to regain her station? This is, therefore, what he did. He bore away to starboard and finally turned to a north-westerly course. Were the Japanese tactically sound in steaming past and heading off the Russians? Should they not rather have allowed them gradually to alter course for their port and thus have encouraged them not to bear away but to remain under their guns? Should they not have used their superior speed to close in, and thus to make their superior gun fire more effective, rather than to forge past? In suggesting this the position of the sun is not forgotten. After an interval, the Japanese turned outwards to port in succession, until they headed about N.W. by W., and steered a course approximately parallel. At 6.30 the *Rurik's* steering gear was damaged, and she left the line, being no longer under control.

During the next two hours the action pivoted on the disabled *Rurik*, and was fought at long ranges of about 7000 yards. Generally the courses were parallel, but broken from time to time by sixteen point turns in succession and away from the enemy, except once at 7.22, when the Russians turned towards (Diagram II.). Up to 7.28 the courses were approximately N.W. and S.E., and Kamimura remained between Jessen and his base. Then the Russians were headed off, and stood to the southward (Diagram III.). At

A map showing a flight path with various distances and bearings. A north arrow is in the top left. A scale bar at the bottom indicates 0 to 5 miles. The path starts at a point labeled '6.45' and proceeds through several points with distances like '8000 yds', '7.14', '7.28', '6.47', '7.19', '7.28', '7.4', '6.59', and '7.00 yds'. A central area is circled and labeled 'Area not under control in this area'.



7.44 the Russians turned in succession to the N.E., whereas the Japanese continued to stand to the S.W. until 8.1, when they turned in succession to port, and stood to the eastward. These Japanese movements seem to have been unduly influenced by the *Rurik*, which was now a beaten ship. Jessen's path to his base was left clear, but he did not take advantage of the opening. At 8.9 he turned again to relieve the *Rurik*, and did not finally give her up until 8.22, when he stood to the northward chased by Kamimura. The action with the *Rossiia* and *Gromoboi* was continued at ranges varying from about 6500 to 8000 yards until 10.5, when the Japanese ceased fire and gave up the chase. The disabled *Rurik*, still able to steam from 8 to 12 knots, was attacked about 8.45 by the *Naniwa* and *Takachiho*, cruisers of about 3700 tons displacement, and then nineteen years old. These ships circled round her at ranges varying between 7000 and 4000 yards, and perhaps fired upwards of 600 rounds from their united broadsides of ten 6-inch guns. By 10.5 her guns were completely silenced, and the action ceased. It was not until about 10.40 that she foundered, and then not in consequence of injuries received, but of action taken by her commanding officer, who caused the Kingston valves to be opened.

The number of rounds fired by the four Japanese ships in the line may be taken as upwards of 4500 from the 8-inch and 6-inch guns, besides many from the 12-pounders, which may be neglected. The number of hits made on the Russian ships is not exactly known. Those actually mentioned are—

	On hull.		On armour.		Within 4 feet of W.L.
Rossiia,	31	including	4		4
Gromoboi,	27	„	4		5

These do not include hits on boats, funnels, masts, which might well number as many more.

The *Rurik* must have been struck by a greater number, as she received most of the fire during the early part of the fight, besides that from the two cruisers during the latter part. Forty-five are mentioned on the hull, but there were undoubtedly many more. It would seem that 90 hits each on the *Rossiia* and *Gromoboi*, and 150 on the

Rurik would cover the hits on all parts and provide some margin. If those numbers are accepted, the percentage of hits to rounds fired would have been about six, and for our purpose this very rough estimate will suffice until more accurate information is forthcoming.

The number of rounds fired by the *Rossiia* and *Gromoboi* may be taken as nearly 2000 from 8-inch and 6-inch guns, besides many from 12-pounders which may be neglected, or for the three ships less than two-thirds of the number fired by the four Japanese. The number of hits on the Japanese ships admitted in their official medical history is—

Idzumo, more than 20,	of which 5 caused casualties.
Adzuma, about 10,	„ 3 „
Tokiwa, 3,	„ 1 „
Iwate, one 8-inch among others,	„ 1 „

This indicates less than two per cent of hits to rounds.
The casualties were:—

<i>Russian.</i>			<i>Japanese.</i>		
	Killed.	Wounded.		Killed.	Wounded.
<i>Rossiia</i>	47	153	Idzumo	3	18
<i>Gromoboi</i>	93	166	Adzuma	...	8
<i>Rurik</i>	180	239	Tokiwa	...	3
			Iwate	39	39
			Naniwa	2	9
			Takachiho	...	14

The large number in the Russian ships was due chiefly to the greater number of hits received, to the number of men needlessly kept at the smallest guns, and perhaps to the lack of protection to the gun positions from fragments of bursting shells. This last finds some support from the fact that only two men were wounded in the casemates of the *Gromoboi*, on which only one direct hit was recorded. The larger number of hits received by the Russians is to be accounted for by the greater number of guns brought against them, and possibly to the superior use made of those guns. This disparity must have increased as their own guns were gradually silenced.

The immunity of the Japanese from loss was due principally to not being hit. This may have been due to bad

shooting on the part of the Russians, but at some period the larger number of Japanese guns must have begun to beat down the fire of their opponents. For instance, such imperfect accounts as we have seem to indicate that early in the action the *Rurik* began to suffer to such an extent that her fire must have slackened. Again the use of armour protection for the gun positions may have contributed in some small degree to reduce the Japanese casualties, but until we know how often this was struck by fragments, or hit directly, its proper value cannot be assigned. So far all we know is that the great loss in the *Iwate* was due to an 8-inch shell which passed through the roof of the foremost 6-inch casemate, and exploded the ammunition and shell inside.

This action, as well as that off Chemulpo on the 9th of February, seems to indicate that, although resistance to direct perforation by the larger guns carried by ships of the line is now impossible without excessive sacrifices in other directions, the gun positions should be protected by armour against fragments of bursting shell.

Turning to the armour protection in the neighbourhood of the water-line, we have to note that the Japanese fired upwards of 4500 rounds, of which a large proportion must have been aimed at the *Rossiia* and *Gromoboi*, but that those ships are reported to have been hit only nine times within four feet of the water-line in an action lasting more than four hours. Their floating power was not seriously compromised although they were practically beaten ships. The *Rossiia*, with 200 casualties, had only two 8-inch and two 6-inch guns remaining fit for action. The *Gromoboi* had 259 killed and wounded, with one 8-inch and three 6-inch guns disabled. Again the *Rurik* was completely beaten and her fire silenced, but she still floated and was only sunk by opening the Kingston valves. These facts tend to show that in the designs of the Russian ships too much regard was paid to the supposed dangers to flotation and stability. An undue proportion of weight was allotted to the 10-inch belt of the *Rurik*, to the 8-inch of the *Rossiia*, and perhaps even to the 6-inch of the *Gromoboi*. This conclusion is supported by previous war experience, including Lissà, Point Angamos, the Yalu, Santiago, the destroyer actions off Port Arthur,

and the battle of the 10th of August. As already pointed out on p. 20, ships need not be made absolutely unsinkable, but only sufficiently so to win victory.

We are now in a position to examine the war results of an armoured cruiser policy. The fundamental idea underlying that policy, which originated abroad and not in this country, was to attack not the armed ships of the enemy, but his defenceless merchant-men. In six months the Vladivostock squadron made five raids,¹ during which they captured and sank, or sent into port, thirteen Japanese ships—viz., five steamers, three transports, and five sailing ships, besides six neutral steamers. One other transport reached port in a sinking condition. This work might perfectly well have been done by ships of much smaller force. Ships of the line are not required to capture *Kinshu Maru*. The effect of these captures on the course of the war was very small. The want of enterprise shown by the Russians is sometimes held to account for the small results. Was not this want of enterprise inherent in, and fostered by such a policy? Just after starting for the April cruise the *Rurik* was sent back, because her speed was deficient. This means that the Russian Admiral was thinking not of fighting, but of running away. How can warlike enterprise be expected from men whose chief idea is to run away and to avoid fighting? But is the policy of evasion possible in such narrow waters as the Sea of Japan? The three cruises in April and June, during each of which an action was only avoided by weather conditions, or the fall of night, and the final one in August, when the Russians were brought to battle, show that fighting cannot long be avoided if the forces remain in the same seas. Sooner or later the capital ships—i.e., the ships of the line, must meet to decide who shall control the waters in dispute. Were the Russian ships themselves suitable instruments for fighting? The policy of attack on the defenceless merchantman and of evading action with the armed ship placed in the forefront the chase or the retreat and the value of end-on fire; broadside action was kept in the background. This explains the faulty dis-

¹ 9-14/2; 24-29/2; 23-27/4; 12-19/6; 28/6-3/7.

positions of the 8-inch guns, and the mounting of some 6-inch guns which could not be used on either broadside.

Again the large coal supply which involved large displacements and a sacrifice of fighting power in the shape of guns and armour protection may be attributed to the same cause. When the *Rurik* was left unsupported during the opening phase of the action on the 14th of August, the Russian Admiral was under the influence of the idea of avoiding fighting, but under the stress of battle the spirit of that brave man and his companions in arms revolted against that policy. Again and again he returned to aid his battered comrade, but his efforts were useless. His defeat had been prepared long before by the faulty military principles which had governed the designs of his ships, and by the wrong ideals which directed and controlled the use made of them.

The armoured cruiser policy was not based originally on true conceptions of war. It involved not only a faulty strategy, but mistaken tactical ideals, both of which reacted on ship design. The essential feature of the armoured cruiser design was a sacrifice of fighting power to mobility in the ship of the line. If it is admitted that the policy was based on faulty strategy and tactics, that sacrifice cannot have been justified. The proportion of fighting power allotted to armour in the ship of the line may have been excessive, but what justified the sacrifice of guns? What are the reasons for it now? Are they tactical? Is it quite certain that in war games and tactical exercises during peace undue importance is not attached to supposed tactical advantages, and that actual fighting is not relegated to a secondary place in the mind? Are the conclusions based on true premisses? In time of peace make-belief under mistaken ideals may be practised with impunity, but in war there is no make-belief. Then realities will have to be faced, as by the Russians at Ulsan.

VII.

THE CAMPAIGN OF TSU SHIMA.¹

Note.—The times on the 27th of May are local mean time—*i.e.*, twenty minutes are deducted from the Central Japanese time (135°) kept by their ships during the war. The courses and compass bearings are magnetic.

As early as the 30th of April 1904, the Russian Government decided to send to the Pacific a second squadron to join the ships already there. It was not until the 18th of October that Vice-Admiral Rozhestvenski left Libau with eight ships of the line, five cruisers, eight destroyers, and a number of transports. Tangier was reached early in November. There the squadron divided. One part, under Rear-Admiral Felkerzam, took the Mediterranean route on November the 3rd; the other part, under the Vice-Admiral, and including the heavy draft ships, started *viâ* the Cape two days later. Rozhestvenski reached St Mary's in Madagascar on December the 29th, having made the passage *viâ* the Gaboon on the coast of Guinea, and steamed about 8000 miles in fifty-four days, including stoppages. Felkerzam had arrived at Nossi Bé, in the same island, on the preceding day, and was joined there by the Vice-Admiral on January the 9th. Three days earlier had been received notice of the fall of Port Arthur on the 2nd. The Russian naval force in the Pacific, which the second squadron had been intended to join, had practically ceased to exist. This materially altered the conditions. What was now to be done?

The Russian Government thought that an attempt should still be made to recover the command of the seas

¹ Read on the 8th of December 1911.

included in the theatre of war, but that, as the force then with Rozhestvenski, or about to join him, seemed insufficient to gain that command, all available ships of war remaining in the Baltic should be sent to him. The Vice-Admiral did not share that view. He thought the ships proposed as a reinforcement were without military value, and would weaken rather than strengthen him. He was most anxious to push on at once, and on being overruled, is said to have asked to be relieved of his command, and to have been refused. It must be admitted that his position was very difficult. He was being sent with an insufficient force to fight a superior enemy, a service demanding courage, fortitude, and professional knowledge of the highest order.

The squadron remained at Nossi Bé for about ten weeks, and was joined there by additional cruisers, armed merchant ships, destroyers, and transports. During their stay they seem to have been active in harbour drills and exercises. The squadron went out several times for tactical exercise and target practice, but owing to want of ammunition did not fire as often as was necessary. On the 16th of March—a few days after the Russian defeat at Mukden,—Rozhestvenski put to sea with eight ships of the line, seven cruisers, nine destroyers, five armed merchant steamers, fifteen transports, and one hospital ship, or forty-five in all. Steering straight across the Indian Ocean and through the Straits of Malacca, he passed Singapore on April the 8th, and was off Camranh Bay, on the French coast of Annam, on the 13th, having made the passage of about 4500 miles in twenty-eight days. He remained a month off that coast awaiting reinforcements, and owing to difficulties raised by the French passed one-third of the time at sea, burning much valuable coal. On the 9th of May Rear-Admiral Nebogatoff joined with the third division, consisting of one ship of the line, three coast defenders, one cruiser, and several transports, having made the passage of about 10,000 miles in eighty-three days. On the 14th Rozhestvenski started with the united fleet of fifty ships for Vladivostock *via* the Straits of Korea as being, in his judgment, the shortest and best

route to follow, although he had no doubt that he would meet, and would have to fight, the whole Japanese fleet. He thought his duty was to court an action, but he well knew that he had little chance of winning. Hence at the back of his head was the idea not of victory, but of getting through to Vladivostock. During the passage time was wasted in searching and capturing neutral merchantmen, —a perfectly useless operation, which could in no way contribute to the defeat of the Japanese fleet, to which every effort should have been directed with single-minded energy. On the 23rd, being in lat. 27.15 N., and long. 125.20 E., or about 240 miles S.E. by S. of the Saddle Islands, the fleet completed with coal to the utmost capacity of the ships, and if possible, as is said, to an amount which would leave them with the normal supply on the morning of the 26th.

Rear-Admiral Felkerzam died the next day. His death was not communicated to the fleet, and his flag was kept flying, his duties being taken by the Flag-Captain, Ber.

On the morning of the 25th, being about ninety-five miles from Woosung, the transports were detached to Shanghai under convoy of the armed merchant ships *Rion* and *Dniepr*. The former were to show themselves off the Saddle Islands, and the latter were to proceed to the northern part of the Yellow Sea. Three days earlier the armed merchant ships *Kuban* and *Terek* had been detached to the east coast of Japan. In all three cases the object is stated in the Vice-Admiral's report to have been to "compel the enemy to detach some vessels, even if they were scouts, to the eastern shores of Japan and to the western coast of Korea." This was to repeat the futile Vladivostock cruiser policy, and shows how widespread and deeply rooted in the Russian Navy were the mistaken ideals which underlay it. The Japanese knew well that such detachments were of no importance compared with the destruction of the Russian main fleet, which would cover all else. Their business was to concentrate every ship which could serve to bring about that result. On parting company with the transports the Russian fleet steered to pass twenty-five miles south of Quelpart, and towards

evening of the same day first came into wireless touch with the Japanese cruisers. At midnight on the 26th they were steering N. 64 E. (magnetic) at a speed of 8 knots, and were some 40 to 50 miles from the Goto Islands, Shirose Light bearing about W. or W. by N.

Turning to the Japanese we find that, as soon as the Russian fleet left Libau, Admiral Togo began to prepare to meet it. Ships were detached singly to be docked and repaired in the home dockyards. Early in November the importance of capturing Port Arthur and of destroying the Russian ships was represented to General Nogi. A few days later the Japanese calculated that Rozhdestvenski might reach the Formosa Channel early in January, so that, as two months were required to repair the Japanese ships, it might be necessary to raise the blockade at the end of November. Thus urged, General Nogi began the third general assault on the 26th of November, and carried 203 metre hill — the key of the position — on the 5th and 6th of December, having lost upwards of 16,000 officers and men in this attack. A few days later the ships in the port were either sunk or disabled by gun fire.

Driven out of port before dawn on the 9th of December by fear of the Japanese siege batteries, the *Sevastopol* finally anchored close inshore off Hakuro, and about one mile south of Man-teou-chan. Here, protected by her own beam defence nets supplemented by temporary ones arranged round the bows and by others suspended from a floating boom placed ahead of the ship, she beat off repeated attacks made by the Japanese torpedo-boats. On leaving the harbour her crew numbered only 100, but was raised subsequently to 300, less than half the proper complement. Assisting in her defence were the gunboat *Otvazhni*, at least three destroyers, a merchant steamer, some launches and small craft, besides two batteries on Hakuro, and perhaps some guns on Joto-san. The guns used are said to have been 30 in all, viz. :—

2 12-inch	} of the <i>Sevastopol</i> .	7 12-pounders	} of the destroyers.
4 6 "		10 3 " "	
1 9 "	} of the <i>Otvazhni</i> .	2 6-inch in Hakuro battery.	
2 12-pounders		2 3-pounders in a signal battery.	

Searchlights were used from the *Sevastopol*, the *Otvazhni*, and the destroyers, besides two or three worked from the shore.

In the attacks made 10 groups of torpedo-boats numbering 30 in all took part, besides two smaller boats and two or three picket boats belonging to the fleet. The results are summarised in the following table:—

Date.	No. of boats		Assumed number of torpedoes fired.	Result.	Japanese Casualties.
	Employed.	Attacked.			
9-10/12	7	3	6	Nil.	Nil.
11-12/12	6	5	10	Nil.	Nil.
12-13/12	4	4	8	Hit <i>Sevastopol's</i> nets; submerged torpedo flat flooded.	2 boats hit. 3 wounded.
	2 picket boats.	2	2		
13-14/12	7	3	6	Nil.	No. 53 lost, with 18 lives.
14-15/12	At least 24	At least 24	48	Nil.	8 boats hit. No. 42 lost, 12 killed, 13 wounded.
15-16/12	9	9	18	<i>Sevastopol</i> hit in stern; leak in side caused by explosion in nets; <i>Serdityi</i> torpedoed.	3 boats hit. 4 killed. 1 wounded.
		50	98		
				4 effective.	

The number of torpedoes actually fired is not known, but it is assumed that each boat fired on each attack two from the 3 14-inch tubes she carried. It will be noted that 50 attacks were made on six nights and that about 98 torpedoes are assumed to have been fired, out of which only four took effect. On the night of the 12th-13th one exploded in the bow nets of the *Sevastopol* and caused a leak which flooded the submerged torpedo flat. On the 15th-16th another exploded in the nets and damaged the side, while a third struck the stern where it was unprotected by nets, blew a hole in the quarter, flooded the after compartments, and disabled the steering gear. The fourth struck and disabled the destroyer *Serdityi*. Thus about 4 per cent of the torpedoes fired were effective. Of the remainder some missed and others struck the nets; of these last some exploded, while others did not. The losses

suffered by the Japanese were not inconsiderable. Two boats were destroyed—one by gun fire and another probably by a mine; 13 boats were hit; 34 officers and men were killed or drowned, and 17 were wounded. The final result was that the *Sevastopol* was able to proceed under her own steam into deep water, and was there sunk under the direction of her own captain after her crew had been landed. The *Otvazhni* was blown up by the Russians. The Whitehead had again proved itself an ineffective weapon. It is difficult to resist the conclusion that the *Sevastopol* in her partially manned and unprepared condition might have been surprised, boarded, and "cut out" with a smaller expenditure of life and in a shorter time.

The bulk of the Japanese fleet was now free to go home for docking and repair, which it did towards the end of the month, leaving a small force to watch the port until its fall on January the 2nd. Togo went to Tokyo.

Under the idea that the Russian fleet might reach the China Sea in January, ships were detached about the middle of December to reconnoitre as far south as the Straits of Sunda, and were absent about a month. As the ships at Vladivostock might try to join Rozhdestvenski, the force in the north was strengthened early in January with a view to watching the Tsugaru Channel and, as soon as the ice would permit, the passages through the Kurile Islands.

As the ships completed their repairs they assembled at their new bases, the First and Second Squadrons in Douglas Inlet, where Togo rejoined on the 21st of February, the Third Squadron in Tsu Shima Sound to guard the Straits, of which Vice-Admiral Kataoka took charge on the 5th of April.

A detachment under Vice-Admiral Dewa was sent south to reconnoitre. He was off Singapore on the 15th of March. Three days later Tokyo knew that Rozhdestvenski had left Nossi Bé for an unknown destination. It was not until the 30th that reliable news was received there that the Russian fleet had been sighted in lat. 9° S. and long. 53° E., steering north-east. Dewa returned to Douglas Inlet in the Straits of Korea on April the 1st. On the

8th, Tokyo knew that Rozhestvenski had passed Singapore that day, and that Nebogatoff had left Djibouti in the Gulf of Aden the day before. Reports of their further movements were very conflicting, but it was thought that if the former continued his voyage north—as is now understood to have been his own wish—he might reach the Straits of Korea on the 19th. Togo was now ordered to await the arrival of the Russians in Japanese waters, where it could be intercepted and dealt with most easily and with the least uncertainty. The detachment in the north was at once recalled, except two armed merchant steamers and a few small craft. Kamimura was sent to mine the approaches to Vladivostock, which he did on the 15th.

The organisations of the two fleets, the names of the ships engaged in the battle on the 27th of May, together with their measured mile speeds, displacements, guns, and complements are given in Tables XII. and XIII. Each side had twelve ships in the line, but the three Russian ships of the *Apraxine* class were very inferior in gun power, speed, and size to any Japanese ship in the line. In guns the Russians could oppose 98 to 127 of the Japanese. In speed the Russians were much inferior, as their maximum as a fleet was not more than 11 knots, according to Rozhestvenski's report, whereas the Japanese actually maintained 15 knots during the battle. In addition to the ships in the line, the Russians had eight cruisers with an united broadside of 43 guns, of which 22 were 6-inch, while the Japanese had sixteen such ships with a total broadside of 89 guns, of which 42 were 6-inch or above. The collective gun power of the cruisers was a factor by no means to be neglected. Of torpedo craft the Russians had only nine destroyers against which the Japanese could bring twenty-one besides forty-four torpedo-boats.

It is a curious fact that Rozhestvenski when comparing the two fleets dwelt on the greater skill of the Japanese, and on the superior speed of their ships, but made no allusion to their greater gun power—a most important factor. On the other hand, he correctly judged that the preponderance of Japanese torpedo craft would only tell after the guns had decided the battle.

The Russian ships of the line were in three divisions, each of four ships. The first, with a broadside of 40 guns, was led by Vice-Admiral Rozhdestvenski in the *Kniaz Souvorov*, the second, with a broadside of 35 guns, by Rear-Admiral Felkerzam in the *Oslabya*, and the third, with a broadside of 23 guns, by Rear-Admiral Nebogatoft in the *Nikolai I*. The Japanese were in two divisions, each of six ships. The first had a broadside of 63 guns, and was led by Admiral Togo in the *Mikasa*, having Vice-Admiral Misu in the rear ship—the *Nisshin*. The second carried a broadside of 64 guns, and was led by Vice-Admiral Kamimura in the *Idzumo*, with Rear-Admiral Shimamura in the rear ship—the *Iwate*.

The four larger Russian cruisers with a united broadside of 27 guns formed a division under Rear-Admiral Enkwist in the *Oleg*; the four smaller ones seem to have worked independently. The Japanese cruisers were grouped in four divisions, each consisting of four ships, and commanded by a flag-officer. On both sides four was the usual number of vessels in destroyer flotillas and torpedo-boat groups.

The recognised Russian fighting order was one column of battleships in line ahead or abreast, and one column of cruisers in line ahead or abreast. That of the Japanese was a number of independent columns in line ahead, two of ships of the line and four of cruisers. The latter was a much more flexible arrangement than the former, and lent itself to attacking tactics. On the part of the Russians, in default of a signal from the Vice-Admiral, the officer in charge of the cruisers was free either to support the battleships, or to operate against the hostile cruisers and protect the convoy. In the actual battle Rear-Admiral Enkwist seems to have been directed to protect the convoy, and to engage any ship detached from the Japanese main body. Elaborate orders were issued to govern the movements of the convoy, the assistance to be rendered to disabled ships, the transfer of flag-officers, &c. All which indicates that they were thinking of, and preparing for, defeat rather than victory. The fate of the convoy was of little importance compared with the defeat of the Japanese principal force, on which everything depended, and on which all efforts should have been concentrated. The Japanese plan was that their cruiser divisions

should attack the Russian convoy and protecting cruisers. Again the Russian battle speed for ships in the line was to be made by signal, and was limited to 11 knots, while that of the Japanese was fixed beforehand for each division, and was 15 knots for their first division. It will be seen that the Russians were decidedly inferior in material strength, but this was not their chief weakness. A careful study of Rozhestvenski's report, of the Nebogatoff court-martial, of the works of Semenov, Politovski, and others, shows clearly their deficiencies in professional knowledge, in caring for and maintaining their ships, in handling them, in gunnery and tactical skill. Originally ill officered, poorly manned, and badly found, they do not seem to have improved much during the passage out. Owing to want of sufficient target practice, their shooting was not good. Since leaving Libau, as Rozhestvenski says, they had been in a constant state of preparing not to attack the enemy, but to be attacked by him—a state of mind much akin to that of the Italian fleet under Persano in the Lissa Campaign, and a sure presage of defeat.

The Japanese, on the contrary, were veterans flushed with victory. Their ships had been recently docked and repaired, and were in a high state of efficiency. Their military spirit and discipline were excellent. Fifteen months of war and two general actions, besides numerous small affairs, had given them large experience and had enabled them to perfect their tactics and improve their shooting. Confident in their own superiority they were eager for, and thinking only of attack, *i.e.*, not of what the enemy could do to them, but of what they could do to the enemy.

On the night of the 26-27th of May the disposition of the Japanese fleet was as follows: the main body of the First and Second Squadrons, with steam ready, were lying in Douglas Inlet and the bulk of the Third in Tsu Shima Sound. Some sixty miles from Cape Kozaki, the southern point of Tsu Shima Island, and covering the approaches from the southwest, were spread as look-outs two lines of cruisers. The third division (4 ships) under Vice-Admiral Dewa in the *Kasagi*, the *Akitsushima* and *Idzumi* of the sixth division formed the second line, the last named being on the left. In advance of these were the *Shinano Maru* and three other

armed merchant steamers. Patrolling the western channel between Sentinel Island and the south point of Tsu Shima Island were some ships of the seventh division under Rear-Admiral Yamada in the *Fusoo*. The fourth destroyer flotilla was under Vice-Admiral Dewa's orders, but had been driven into Tsu Shima Sound by stress of weather.

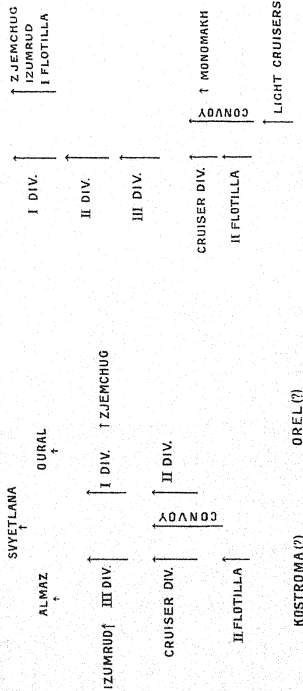
On the same night the cruising order of the Russian fleet was two columns in line ahead disposed abeam. The first and second divisions formed the starboard column, and in the port were the third and cruiser divisions. Looking out ahead were the *Soyetlana*, *Almaz*, and *Oural*, under Captain Shein of the first-named ship. On either beam were the *Zhemchug* and *Izumrud*, the former to starboard, each accompanied by two destroyers of the first flotilla. The second flotilla was in single line ahead astern of the cruiser division. The six merchant ships, or convoy, were in single line ahead between the two columns, but somewhat to the rear. On either quarter of the fleet were the hospital ships *Orel* and *Kostroma*.

During the night the wind was light from the westward, the weather misty, and at times thick. About 2.30 A.M. the *Shinano Maru* sighted a steamer, which she followed and at daybreak made out to be one of the Russian hospital ships. Shortly afterwards she sighted the main body of the fleet and at once communicated the fact by wireless, not only to the ships on look-out, but to Vice-Admiral Kataoka in Tsu Shima Sound and to Admiral Togo in Douglas Inlet, both of whom received it shortly before 5 A.M. With all ships present, the former sailed half an hour later and shaped course to pass south of Tsu Shima, the latter put to sea about 6.15 and steered to go north of that island. At this time the sky was overcast, the weather misty, and the sight limited to five or six miles, the wind was fresh from the W.S.W. and the sea heavy for the Japanese torpedo-boats, which were ordered to seek shelter under the lee of Tsu Shima. At daybreak the Russian fleet remained still in the same order, but the three cruisers looking out ahead were then recalled and took station in single line ahead astern of the fleet to protect the convoy. The course was still N. 64 E. (magnetic). At some uncertain time the speed was increased

RUSSIAN ORDER

MIDNIGHT 26-7 MAY

11 A.M. MAY 27



to 9 knots. About 5.30 A.M. the hospital ship *Orel* sighted the Japanese third division, which seems to have twice crossed astern of the fleet without seeing it. About 6.30 the *Idzumi* appeared two points abaft the *Souvorov*'s starboard beam at a distance of about six miles, where she remained for some hours. Admiral Rozhdestvenski's report says that cruisers were not detached to drive her off, because there was "a possibility of their being carried away towards superior forces concealed by the mist." This really means that any ship detached for the purpose might never rejoin and thus be absent from the battle. The argument is perfectly valid when applied to ships of such force that their absence would be felt, but not to such light cruisers as the *Svyetlana*. It is to be noted that any detached ship unable to rejoin within two hours of the fleets sighting each other would have been too late, since the battle was decided within less than that time. The real reason why the attempt to drive off the Japanese cruisers would have been futile was their superior number. About 9.35 the fifth and sixth divisions appeared abaft the port beam, and drawing past were replaced three quarters of an hour later by the third division on the same bearing. Thus there were now seven cruisers on the port bow, four on the port beam, and one on the starboard hand. What could the four light cruisers or even the whole eight do against twelve? If used judiciously some of the twelve could always keep touch and one such is sufficient to observe and report. The essential of an efficient scouting service is numbers and not ships of great force, which when detached sap the line of battle strength. However this may be, the Japanese cruisers maintained touch until the battle began.

As soon as the Japanese cruisers were sighted on the port beam Rozhdestvenski, expecting an attack from that direction, passed from cruising into fighting order. The starboard column—first and second divisions—increased speed to 11 knots, steamed ahead, turned together two points to port, took station ahead of the port column, and then reduced to 9 knots, the fleet speed. The *Monomakh* took station to starboard of the convoy. The *Izumrud* joined the *Zhemchug* to starboard, and the first flotilla formed astern of her. This detachment was intended to repel the attacks

of torpedo craft. At 0.5 the Russians, believing themselves to be in mid-channel, altered course in succession to N. 27° E. (magnetic). Their actual position is uncertain.

The movement of the Japanese cruisers towards the north led Rozhdestvenski to believe that their main fleet was in that quarter. Thinking that his line ahead might be at a disadvantage if Togo approached from ahead in line abreast, but not wishing any change to be reported to Togo, he waited until the Japanese cruisers were nearly out of sight. Then at 0.20 he signalled to the first and second divisions to turn in succession eight points to starboard, intending, when all had turned, to resume the original course together, and to complete the line abreast by forming up the third division independently to port. The *Souvorov* had begun to turn, when the Japanese cruisers (the sixth division) again appeared ahead out of the mist, whereupon the signal to the second division was annulled, and the first division, when nearly at right angles, resumed the original course in succession instead of together. Thus about 0.30 the Russian fleet was in two columns in line ahead—the first division to starboard, the second and third to port, the distance between the columns not exactly known, but possibly about eight to ten cables. In rear of the port column were the *Oleg* and *Aurora* in line ahead with the second destroyer flotilla, having to starboard of them the transports, protected by the *Monomakh* to starboard, the *Donskoi* to port, and the *Svyetlana*, *Almaz*, and *Ural* in rear. To starboard of the *Souvorov* was the *Zhemchug*, followed by the *Izumrud* and first destroyer flotilla.

At this time, owing to thick weather and strong currents, no one knew his true position. Hence the reports from the Japanese cruisers were conflicting. Both sides were uncertain as to the exact bearing on which the enemy might be sighted. This was to be expected under such conditions, and shows the necessity when in cruising order of being ready to deploy rapidly in any required direction.

At noon Togo thought that he was in lat. 34.30 N., long. 130 E. He was then steering S.E. $\frac{1}{2}$ S. at a speed of 14 knots with the first, second, and fourth divisions in single line ahead, and four destroyer flotillas in company.

The haze was still thick and the wind S.W. to S.S.W., force 5 to 6. At 0.20 he turned in succession to west, and some forty minutes later sighted broad on the port bow his third division under Vice-Admiral Dewa, who reported the enemy five miles astern. Togo now turned in succession to S.W. by S. Presently he sighted the enemy to the south-westward, and at once turned in succession to N.W. by N., except the fourth division which left the line, and need not further detain us. The time may be taken as 1.20, and the distance of the enemy then as about six to seven miles. Shortly afterwards the Russians, still on the course N. 27 E., sighted the Japanese in line crossing their track ahead of them on a course which appeared to be nearly at right angles to their own. (Diagram.) Rozhestvenski's report reads—

The first division of battleships immediately increased speed to eleven knots, and edged to port in order to get ahead of the port column, whilst the signal was made to the transports and their escort to move away to starboard.

But Rear-Admiral Nebogatoff stated to the court-martial that "when it became clear that the enemy wished to cross our bows and pass to our port side, the Vice-Admiral made the signal, 'The first division is to turn two points to port, and increase speed to eleven knots.' We had hitherto been steering at 9 knots." It is uncertain whether the turn was made together or in succession. If the columns were ten cables apart and the port column had continued at 9 knots, the *Souworov* would have reached a position 560 yards ahead of the *Oslyabya* in fourteen minutes. The other three ships of the first division would then have been foul of the second. The rear ship, the *Orel*, would not have drawn clear of the *Oslyabya* until twenty-five minutes after the signal was hauled down—i.e., until after firing began. Rozhestvenski says that these two ships were abreast of each other when the first shot was fired.

Rear-Admiral Nebogatoff's evidence is—

... The first division did not succeed in taking station at the head, and forced the second and third divisions to reduce speed and even to stop engines in order to avoid collision. At that time the enemy continued to cross to the port side, turned twenty-four points to port in succession, and lay parallel to our mob, as this

is the only word literally to express our formation at this time. The first division continued to steam, but at this time, as I have already said, the second and third divisions reduced speed, and even stopped to avoid collision; one vessel had to turn to starboard and another to port, so that there was absolute confusion.

He adds that the *Nikolai*, his flag-ship, did not open fire until eight or ten minutes after the *Souvorov*, and that the line was not properly formed for about fifteen minutes.

The Rear-Admiral's picture so exactly represents what might have been expected to happen that we may take it as largely correct. The Russian fleet was in disorder when the action began, because it was badly handled. Why did not the fast first division stretch ahead at full speed to clear its broadside? There was no pressing necessity to place the divisions exactly ahead and astern of each other. Some latitude is often desirable in battle and is permissible.

Returning to the Japanese, whom we left steering N.W. by N., Togo increased speed to 15 knots, presently headed west; and at some uncertain time after 1.35 turned in succession to S.W. by S. in order, as he says, "to make the enemy believe that he meant to pass him on opposite courses." At 1.45 the *Mikasa* turned to E.N.E. and "bore down on the head of the enemy's line in a diagonal direction." According to Rozhestvenski the *Mikasa*, when she began to turn, was four points before the beam of the *Souvorov*—i.e., she bore N. 18° W. if the latter had resumed the original course. The Japanese history says that the leading Russian ship then bore S. 11° E., but the authority for this is not known. The two bearings agree fairly well. The *Mikasa* had straightened on her new course and her second astern was turning when the *Souvorov* fired the first shot at a range of 6400 yards. That shot fell twenty yards short of the *Mikasa*, and fixes the range approximately. According to Rozhestvenski the *Mikasa* was then less than a point before the port beam of the *Souvorov*, who must have borne away to starboard to bring her guns to bear, since otherwise the *Mikasa* after her turn would have still been well on the bow. How much did the *Souvorov* alter course? We do not know exactly, but assume two.

and a half points to N. 55° E. That there was a decided change of course at this time is supported by evidence. One eye-witness specially mentions that in both fleets ships turned successively into line.

Rozhstvenski writes: "Following the *Souvorov* all the first division opened fire on the leading ships of the enemy and afterwards the others also began as the enemy came into line." It will be remembered that Nebogatoff said that his flag-ship did not fire until eight or ten minutes after the *Souvorov*. That would have been about the time required by the *Nikolai* to reach the turning-point.

We have to observe that Togo turned up so much on the bow of the Russians that he did not control their movements, but left Rozhstvenski free to turn to port if he wished to do so. He was perhaps led to do this by the fear that, if he turned later, he would be exposed to the broadsides of the Russian fleet during the turn. If Rozhstvenski did not want a decisive action he should have turned to port, the fleets would then have passed on opposite courses and Togo might have found himself on the enemy's quarters as on August 10.

The position now was that two fleets, each of twelve ships in single line ahead stretching at least 4400 yards from van to rear and steaming respectively 15 and 9 knots per hour, *i.e.*, 506 and 304 yards per minute, had approached each other bow to bow on opposite courses and were turning in succession 13 and 2½ points respectively round two fixed points 6400 yards apart. The Japanese could not fire until they reached the turn, the Russians could use their bow guns during the approach but under conditions unfavourable to hitting. The whole of the Japanese guns should have been in action about nine minutes after the first shot was fired, but were not so until more than twelve minutes had elapsed, since the rear ships were astern of station; the Russian guns could not all have been in action in less than fifteen minutes, and may have taken longer. At this stage the Japanese superior speed gave them some advantage. The two fleets stood on, the range varying between 6400 and 6300 yards, until 1.55 when the Japanese turned in succession to E. by S., but about three minutes later resumed the original course.

This turn had the effect of reducing the range about 500 yards, but did not throw any guns entirely off their targets. The *Mikasa* had by this time 3 killed and 51 wounded, 31 being due to two 12-inch and 23 to two 6-inch shells. By about 2 P.M. their rear ship was probably swinging into line, and they had nearly all guns in action, whereas at least two of the Russian ships could not have yet turned to the new course. Seven ships had opened fire with 73 guns on the *Oslabya*, four using over-long ranges between 8700 and 6800 yards and three nearly correct ones between 6300 and 5900 yards. Four ships with 32 guns had begun on the *Souvorov* at ranges between 6500 and 7000 yards. It is of this period that Rozhestvenski writes:—

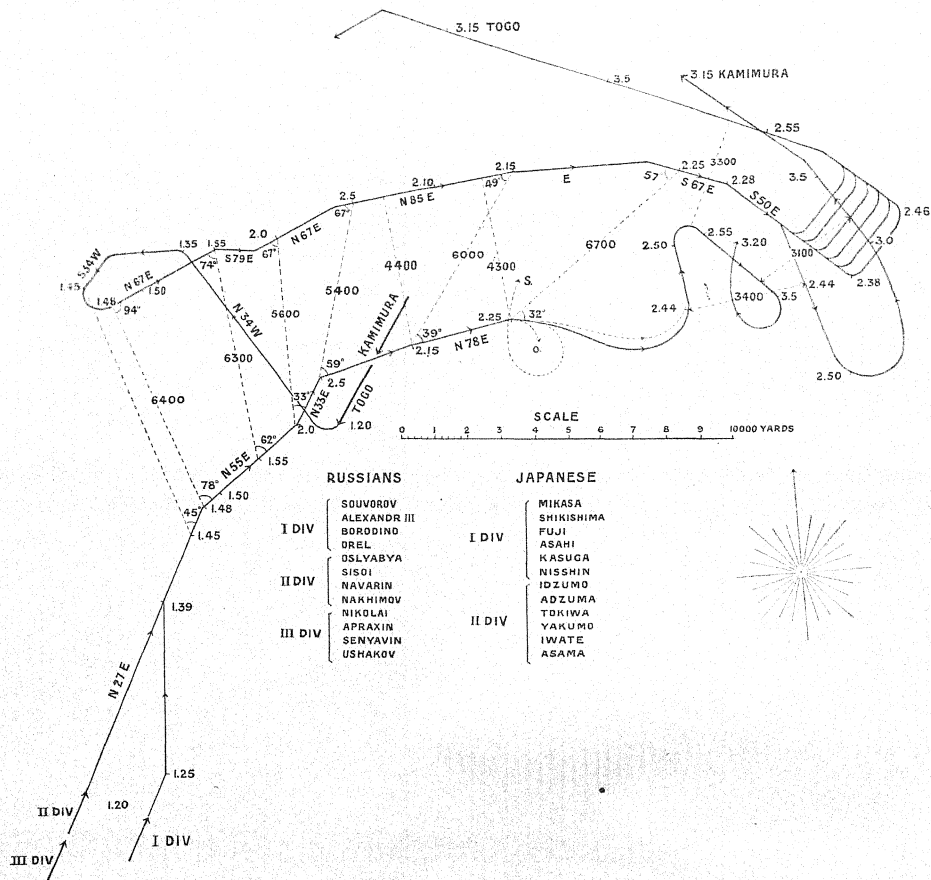
For ten minutes the Japanese were getting the range. The only hits were apparently from fragments of shell which burst on striking the water, but at 2 o'clock the enemy began to hit continuously whilst the firing of our ships was ineffective. Wishing to change the range I altered course two points to port, but did not continue on the new course for more than five minutes, because the *Mikasa* and the five battleships with her were fast forging ahead and were concentrating their fire on the *Souvorov* and *Alexandr*, whilst the *Mikasa* herself was not sufficiently subject to the fire of our ships. At 2.5 I gave orders to alter course four points to starboard.

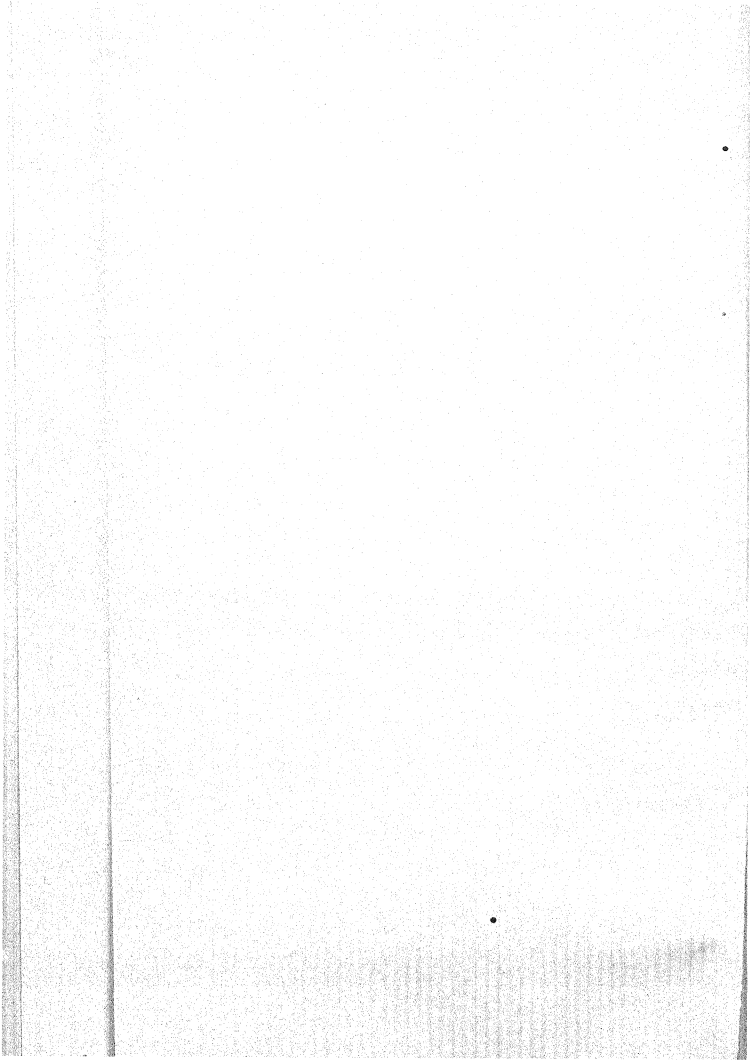
How could he know that his fire was ineffective? As a matter of fact the *Mikasa* already had fifty casualties. Under such circumstances the fortitude and steadfastness of an Admiral are most severely tried; the temptation to do something is very strong; there is no time to think, he is pressed to act, and the correctness or otherwise of his action depends on whether he has thought long before. Had Rozhestvenski done so, he would have known that victory depended upon keeping his guns steadily bearing on the enemy. This he did not do, but turned two points to port, which had the disastrous effect of throwing the Russian guns off the Japanese van, and successively, as their ships reached the turning-point, off the targets at which they were firing, while the range was not greatly reduced. When the Japanese had got the range and were hitting continuously, and when the defence to be derived from his own gun fire was most required, Rozhestvenski

turned the wrong way, thus contributing greatly to his own defeat.

The fight had culminated. The Japanese continued to forge ahead, their untouched rear defiling past the crushed Russian van, and their leading ships gradually increasing the range, thus making their fire less effective, until about 2.25, when the first division lost sight of the enemy and ceased fire for a time. About this time the *Oslabya* and *Souworov* were beaten and quitted the line. The former foundered about 2.45. The remaining ships were thrown into confusion, and with the Japanese across their track, thus not controlling their movements, turned to N. by W. in no regular order. Eventually the *Alexandr* led, and the third division found themselves ahead of the second. To meet this movement at about 2.38, Togo turned his division together eight points to port, and some six minutes later another eight points. The *Nisshin* was now leading, and steered W.N.W. Presently the Russians turned in succession sixteen points to starboard under the broadsides of Togo's division, and threw out of action such of their own guns as remained effective. They had turned the wrong way, and the range being at one time not more than 3000 yards, they suffered accordingly. This was about 2.50 to 2.55. Kamimura did not turn with Togo, but stood on and led his division past the enemy at a range of rather more than 3000 yards until about 2.50, when he turned in succession sixteen points to port. He was now steering about N.W., and presently passed the Russians heading to the south-eastward at a range of about 3000 yards. These last, instead of turning to port under his stern to avoid a decisive action, altered course in succession sixteen points to starboard. They had again turned the wrong way and thrown all their guns off the enemy. The remaining movements on either side possess little tactical interest. The Russians tried to avoid action and to get away to the northward, under cover of the dense smoke and thick haze which covered the field of battle. The Japanese tried to get into contact, but when they did so, as at 3.45, and a good opportunity offered with both fleets heading the same way, they did not make full use of it. They steamed past at a range

TSU SHIMA





of some 4000 to 5000 yards, headed off the Russians, as they did at Ulsan, and lost contact, instead of trying to keep them on their course and under the fire of their own guns at short ranges. Had they done so, they might have anticipated, and bettered, what was done at longer ranges some two hours later. They would probably have sunk not only the *Alexandr* and *Borodino*, but the other ships in company with them. The advantage of keeping to one uniform speed in battle is no doubt very great, but to maintain it when it takes your guns off the enemy, either by steaming past or by heading him off, is no advantage but a blunder, especially when you have a greatly superior number of effective guns. We have to note the great difference between "defiling" past the head of the Russian line with its guns out of action, as in this battle, and steaming past an unbroken enemy under the steady fire of his guns, as Togo attempted, but failed, to do on August the 10th.

Here we may digress to deal with the Whitehead torpedo. The Russians had present 9 destroyers which were of no military value in the battle. The Japanese had available 5 flotillas, or 21 destroyers, each with 2 18-inch tubes, and 10 groups, or 39 torpedo-boats, each with 3 14-inch tubes, but only 19 of the former and 26 of the latter seem to have attacked, which would give 116 tubes in action. Four Russian ships seem to have been struck. The disabled *Souvorov* was attacked in broad daylight by 2 flotillas and 1 group—28 tubes in all. She was struck twice, which represents about 7 per cent of hits to tubes, or assuming only 75 per cent of tubes were used, about 10 per cent of hits to torpedoes fired. The *Navarin*, *Nakhimov*, and *Monomakh* seem to have been hit during the night. The first is said to have been struck by 4 torpedoes, and to have sunk immediately; the second and third did not founder until 10 A.M. The *Monomakh* is said to have been hit only once, as also probably was the *Nakhimov*. This makes 8 hits in all due to 116 tubes, which represents about 7 per cent, or assuming only 75 per cent of tubes were used, nearly 9 per cent of hits to torpedoes fired.

The broad results produced by the Whitehead torpedo during the war have been summarised in Table XIV. They are necessarily only approximate, as the information is very

imperfect. It will be seen that out of about 370 believed to have been fired by the Japanese, only 17 took effect, including 8 on ships at anchor. This is about 4 per cent. It is true that two Japanese torpedo-boats under way were struck, but whether by their own or by Russian torpedoes is not certain. The total number fired by the Russians cannot be estimated. We have confirmation of 12, of which 8 took effect, but in every case the ship struck was motionless, and 6 out of the 8 were fired at defenceless merchantmen. Others were probably fired, but it is certain that none, except perhaps the two doubtful ones before mentioned, took effect.

These results are very remarkable, and afford much food for thought. The Whitehead torpedo of that date was either as inaccurate as the gun, or was "blind" on striking. If it was inaccurate, it laboured under the additional disadvantages of having a short range, a slow rate of fire, a very small allowance of ammunition, and of being dangerous to those that used it as it sometimes turned round. If it was "blind," except under specially favourable conditions, its true value as a weapon must have been much below that assumed for it. Again its effect, when it did explode, proved to have been greatly over-rated, and was not vital in the case either of the *Tsesarevitch*, *Retvizan* or *Pallada*, or of three out of four torpedo craft, or of the *Sado Maru*, who was struck twice. It is true that those ships were disabled for several weeks, but the difference is great between a vital blow and one that only damages.

The Whitehead torpedo failed during the period of the Japanese War under review. The candid mind can hardly resist the conclusion that in a ship of the line it was then of little value, and that in the destroyer and torpedo-boat its efficiency as a weapon was then over-rated. Was this failure due to its own inherent imperfections or to its being improperly used? Probably to both causes, but certainly not to any method or practice special to the Japanese, who made as good use of their weapons as would any other nation at that time.

The causes of failure deserve inquiry. In the ship of the line the main reason no doubt was want of opportunity owing to its own short range and the long ones at which actions were fought. The failure in the destroyers seems

to have been due not only to its inaccuracy, but also to the methods of attack, which were influenced mainly by the idea that safety depended chiefly not on beating down the enemy's blows, but on avoiding them. The same call for safety, which led to the introduction of armour and the use of long ranges, operated on the mind of the destroyer officer, and pressed him to seek to escape.¹

In the case both of the Whitehead and of the gun distrust of the protecting power of the weapon in use was the governing factor in the background. That distrust was doubtless never admitted, but it certainly existed, and in the case of the Whitehead must have been much increased latterly by the unlooked-for discovery that only a very small number hit the enemy, and that its blows were so often not vital. Now complete confidence in the weapon, not only to strike down but to protect, is essential to victory.

We have to consider the changed conditions, and to determine the present limitations of the Whitehead as a weapon and its position relative to the gun. Before doing so it may be well to call attention very briefly to some general considerations. When the Whitehead torpedo was first introduced, the gun was undergoing a partial eclipse, brought about by the reduction in the volume of its fire and by its inability to perforate armour. Conditions have now changed. Not only has the volume of gun fire returned to somewhat its old proportions, but the armour is limited in area and is all perforable. The under-water attack no longer has the same relative importance. How then do the gun and Whitehead stand to-day as part of the armament of a ship of the line? The object in war is to disarm the enemy. The gun tries to do this directly by striking at his weapons and *personnel*, whereas the Whitehead aims only indirectly at these by attacking his ships themselves. Again both weapons are very inaccurate at sea and especially in battle. This inaccuracy is counterbalanced in the gun, but not in the Whitehead, by the great rapidity of fire not only from individual guns but also from the larger number that can be carried. Is it not probable that the more direct attack on the true object, and

¹ The comment at p. 58 of the official history on the attack delivered by the Japanese destroyers on the night of the 9th of February reflects the prevailing idea. It reads: "All the destroyers escaped without damage."

the greater rapidity of its fire, will cause the gun to decide the action before the Whitehead can intervene? Altogether do we question the idea that the danger of being hit by the Whitehead, any more than by the gun, should damp the desire to close to decisive ranges whether with guns or Whiteheads.

Since the Russo-Japanese war the range and speed of the Whitehead have been increased and the methods of using it have been improved, but it still remains a very imperfect, complicated, and unreliable weapon. In estimating its true value should we not seek to avoid past exaggerations and to discount carefully the results given by present peace practices?

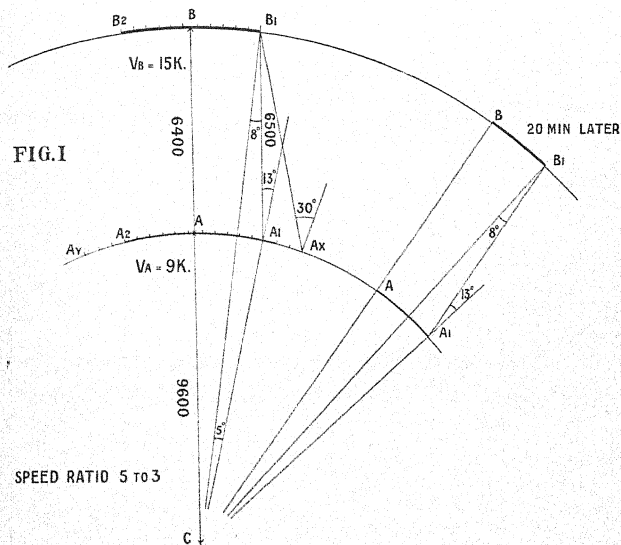
What would have been the Japanese tactical advantage at Tsu Shima, if the speeds had been 24 and 18 knots instead of 15 and 9? They would have been able to turn up with all their guns in action in about $5\frac{1}{2}$ minutes instead of about $8\frac{1}{2}$, while the Russians would have taken about $7\frac{1}{4}$ instead of about $14\frac{1}{2}$. The difference would have been only about $13\frac{1}{4}$ minutes instead of 6. Again, after the turns had been made, the fleets would have been placed on a footing of tactical equality, if they had steamed round circles with radii proportional to the speeds. Fig. 1 opposite shows the circles for speeds of 15 and 9 knots, when the range is constant at 6400 yards for the centre ships and rather more for the van and rear. These relative positions can be maintained if the leading ships bring each other to bear as shown. It will be seen that if Rozhdestvenski had brought the *Mikasa* 13 degrees abaft his beam, Togo would have been constrained to bring the *Souvorov* 8 degrees before his beam in order to maintain at least tactical equality.¹ If the Japanese steered

¹ The relation between the courses is given by the relation

$$\frac{\sin \theta_B}{\sin \theta_A} = \frac{V_A}{V_B}$$

where θ_B is the bearing of the *Souvorov* before or abaft the beam of the *Mikasa*, θ_A that of the *Mikasa* abaft or before the beam of the *Souvorov*, and V_B , V_A the speeds of the *Mikasa* and *Souvorov* respectively. — See *Naval Policy*, by "Barfleur," pp. 238, 263.

FIG. I



more to starboard they would close, but would drop astern in bearing and expose their van; if they turned less they would open, go ahead in bearing, and not fight a decisive action. The Russian defeat was due mainly to the simple tactical mistake of not keeping the enemy on the proper bearing, and in a less degree to the greater number, and possibly to the better use made, of the guns brought against them.

When two fleets meet, and both intend to fight a decisive action, each will try to bring all his guns into action at a nearly constant range, and to keep them bearing. This means that they will sooner or later find themselves steering on parallel lines with their heads in the same direction. If one does not wish to fight, he will either run away, in which case the other will pursue, or he will try to avoid decisive action in some other way, in which event the other will try to control his movements by compelling him to turn to the same course, thus ultimately bringing the two fleets into parallel lines. Decisive action always means fleets, or parts of fleets, ultimately drawn up on parallel lines steering in the same direction. Any difference in the speeds forces curved courses instead of straight ones on the two opponents. The shorter the range and the higher the speed ratio, the more curved will be the tracks. The higher the curvature the smaller the fleets which can maintain tactical equality in this manner. As the lines close, the curvature increases and throws the van and rear ships of the slow fleet out of action. For example, fig. 2 shows that at Tsu Shima, with twelve ships in each line, this would have begun to occur after the range became less than 4000 yards. In that battle the ranges—6400 yards and below—were moderate, but the speed ratio—5 to 3—was very high, since with a lower speed of 16 it means a higher one of 26.6, or a difference of 10.6 knots. The curvatures in figs. 1 and 2 would therefore now be excessive. For very small squadrons the speed ratio might possibly reach 4 to 3, but the curvature would be immaterial in their case. For fleets of any size the ratio will be perhaps 9 to 8 or more probably unity, which means that for present day ranges, speeds, and differences, the courses may be

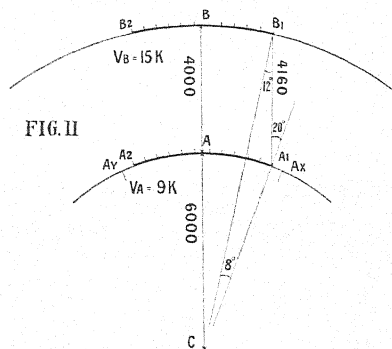
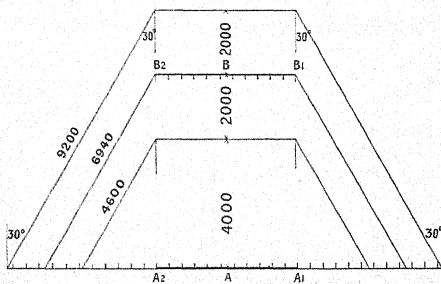


FIG. III



taken as straight, and the permissible number of ships in a fleet unlimited by this consideration.

Whether the speeds be equal or unequal neither side can take position against his opponent's will on the bow of the other with all guns in action. The attempt can always be frustrated by standing on or by turning off. When two fleets once get into parallel lines, whether curved or straight, *i.e.*, into positions such as with proper management the two sides should have assumed at Tsu Shima, the only plan is to fight it out broadside to broadside. So long as there is plenty of sea-room, any practicable difference in the speeds of the two fleets is of little importance. If land or shoals impede free movement, scope will be given for tactical skill, and the result is as likely to accrue to the advantage of the one speed as of the other.

If future decisive battles are to be fought in parallel lines nearly straight, one important consequence follows. It will be possible to bring into action a larger number of ships carrying possibly a greater number of guns. Fig. 3 shows this number for various ranges, when the intervals between the ships are two cables and the gun arcs of training are 30 degrees from the beam bearing. If the leaders keep abeam of each other and maintain the range constant, A will be able to bring into action against B's rear extra ships—eight when the range is 6000 yards, increasing or decreasing by three for each addition or reduction of 2000 yards in the range. If the overlap is established at both ends, as might occur if B closed, the extra ships will be more numerous.

As far back as October 1906, it was shown at great length that in strategy speed is only one of several factors, and is less important than the possession and rapid transmission of correct intelligence, the selection of good positions, and the strategical insight of the Admiral.¹ The arguments used were supported by the capture of Trincomalee in 1782, by Nelson's pursuit of Villeneuve, by the campaign of Lissa, and by the Russo-Japanese War. The conclusions were independently confirmed by a writer in the German review 'Nauticus' for the year 1907. It will not now be necessary

¹ See *Naval Policy*, by "Barfleur."

to dwell further on the point, especially as the tactical side is much the more important, since the true and ultimate rôle of the ship of the line is battle.

We can pass to the sacrifices that must be made to obtain high speed, since we cannot have it without giving up something. Take as a concrete case the sacrifice made to obtain the additional five-knot speed in two modern typical ships of the line, A and B, whose battle speeds may be taken as 17 and 22 knots respectively, whose displacements are about equal and whose weights are distributed thus:—

	A.	B.	%
	% of	% of	Difference
	Weight.	Weight.	between
			B and A.
Hull	34.6	37.1	+ 2.5
Armour	28.0	19.2	- 8.8
Machinery	11.5	19.3	+ 7.8
Coal	5.0	5.8	+ 0.8
Armament	17.3	14.7	- 2.6
Equipment	3.6	3.9	+ 0.3
	<hr/>	<hr/>	
	100	100	

Weight has been transferred from armour and armament in A to the other elements in B to give increased speed, which, as has been shown, yields no adequate tactical or strategical return. A's armour has no great fighting value, since it is limited in area to one-third of the vertical target presented, and is all easily perforable by the 12-inch gun up to 8000 yards, and as to three-fourths of it by the 9.2-inch gun up to 7000 yards, and the 12-inch up to extreme ranges. Thus that given up by B may reasonably be held not to be a real loss. That left to B, being thinner and perforable by the 9.2-inch gun up to 8000 yards, must confer even less fighting advantage, and might be even still more reduced if a gain could be shown in other directions. In fact both ships carry weight—in the one case of armour, in the other of armour and machinery—which gives a doubtful return in battle. If this weight were not carried, they would be smaller and less costly but for one obstacle—the armament. The size of a ship depends largely on the length of the battery, which turns on the number, size, and disposition of the guns. Large guns in any number, especially when

mounted on the centre line, mean a long and therefore a large ship.

This brings us to the accuracy and effect of gun fire. No light is thrown on the accuracy by this particular battle. So many of the Russian ships foundered that neither the number of rounds they fired, nor the number of hits they received, will ever be known. The percentage of hits to rounds in the other actions of the war were—

	<i>Russians.</i>	<i>Japanese.</i>
Chemulpo . .	Nil.	8-in. guns, 10.7.
August 10 . .	1.	6-in. and 4 7-in. guns, 3.2.
Ulsan	Less than 2.	6 to 7.
		Not more than 6.

This confirms previous war experience that it is very difficult to hit at sea. On what does hitting depend?

Firstly, on closing to ranges sufficiently short to make the fire decisive. On the 10th of August, and at Ulsan, the ranges were too long, but at Tsu Shima Togo, profiting by experience, closed at once, and fought the battle at shorter ranges. Nevertheless the lesson does not seem to have been taken to heart. The idea of engaging at very long ranges has been encouraged.

Secondly, on counteracting the errors inseparable from firing at a moving object, either by firing a large number of rounds, which involves a more or less numerous battery, or by the use of accurate weapons and appliances. Two different principles are here seen at work. The principle of numbers is associated with the idea of "decisive ranges," and has been relied on in past wars. The principle of accuracy fosters the idea of long ranges, and in its present extreme development is a peace product. It is important to note that the two principles, instead of being mutual aids, have become antagonistic. Guns have been reduced in numbers and increased in size to facilitate greater accuracy. The peace-tried principle of accuracy tends to undermine and destroy the war-tried principle of numbers. Is it wise and safe either to encourage this tendency or to over-elaborate and over-centralise the control system? Are not the present gunnery ideals based on peace theory rather than on war practice?

Turning to the effect produced by the gun fire, we find that of the Russian ships the information about the *Orel* is the most complete. At the Nebogatoff court-martial a Constructor on board that ship during the action made three definite statements:—

1. That she was struck by 150 large projectiles, of which 42 were 12-inch;
2. That she was hit 30 times in ten minutes, 12 being 12-inch;
3. That between 7 and 7.20 P.M. she was struck by 15 of 12-inch.

Unwittingly he may have exaggerated. It is believed that she received certainly 70 hits, and probably more.

The hits on the gun positions were: one on the port foremost 6-inch turret put it out of action; one on the fore 12-inch turret knocked the muzzle off the left gun; two on the after 12-inch turret both caused casualties, and one struck the armour above the left gun port, bending it down so that the gun could not be elevated. All the turrets were scored by splinters and some by 12-pounder projectiles. The final result was that although no armour had been pierced, eight out of twelve 6-inch and two out of four 12-inch had been silenced, thus showing that a ship can be beaten without perforating her armour. Her casualties were 50 killed and an uncertain number wounded. The four direct hits on the gun positions represent about 5 or 6 per cent of the total hits received, which compares with the 10 per cent received by the Japanese, and with the less than 10 per cent by the Russian ships, on August 10.

The hits near the water-line seem to have been two in number, or perhaps 3 per cent of the total received, as compared with about 5 per cent on the *Ferdinand Max* at Lissa, 21 per cent on the *Huascar* off Point Angamos, and with about 10 per cent on the Japanese ships at the Yalu, on the ships of both sides on August 10, and on the Spanish ships off Santiago.

This difficulty of hitting near the water-line may perhaps explain how it came about that the four ships of the *Orel* class remained afloat so long under the fire to which they

were exposed. Their armour belts were in two streaks. The lower one was 10-inch tapering to about 5-inch forward and aft, and extending from 1.5 feet above to 5 feet below the designed water-line; the upper one was about 8-inch tapering to about 6 or 6.5 inches forward and aft, and was 5.5 feet wide. On leaving Cronstadt the *Orel*, and presumably the other three ships also, was about 2.5 feet over her designed draught, which would place the upper edge of the 10-inch plates 1 foot below the water, and would leave her with 4.5 feet of 8-inch armour above the water-line. It is doubtful whether they were overloaded with coal on the day of the fight. The 8-inch armour was perforable by the Japanese 12-inch guns at the ranges of the battle. The armour belts of the class did not differ materially in thickness and disposition from those of some British ships—e.g., the ship A already mentioned. We have to note not only that the *Orel* was not sunk although she was beaten before her surrender, but that the *Souvorov* remained afloat, and endured a tremendous battering at comparatively short ranges long after her guns were silenced—the one gun that remained in action was of no account—and the *Alexandr III.* and *Borodino* were probably beaten some time before they foundered.

These facts confirm previous war experience that the danger to the flotation and stability is not great. Is it worth while to divert from the guns the great weight required to give effective armour protection to the water-line, when the chances are that the battle will culminate before it is hit? Will it not suffice to make sure that the magazines are safe from direct blows, and for the rest to trust to water-tight subdivision, to armour only so far as it may limit the size of such holes as may be made, and above all to gun-fire to beat down that of the enemy? Is it not more important to disarm the enemy than to sink him? Are not the protection of your own water-line and the perforation of that of the enemy secondary considerations in settling the armour and guns to be carried?

The information about the effect produced by the hits on the Japanese ships is imperfect. The twelve ships in the line received upwards of 140 hits, of which 55 are known

to have produced 309 casualties, but there were 465 in all—*i.e.*, about one-half more than those accounted for. No doubt some casualties were due to splinters from shells which burst short on graze. It seems certain that one-half the hits produced no casualties, as was the case on the 10th of August. If we compare the *Mikasa* alone in the two battles, we find that on the 10th of August 12 out of 22 hits produced no casualties, but seven were unaccounted for, while at Tsu Shima the numbers were 19 out of 31, with twenty-seven casualties unaccounted for. All this tends to show that at that time it was necessary not only to fire a great number of rounds in order to hit, but also to make a large number of hits if the enemy was to be defeated. The experiences of the *Orel* at Tsu Shima, and of the *Rossiya*, *Gromoboi*, and *Rurik* at Ulsan, seem to indicate that although the fight might culminate earlier, about one hundred hits by high explosive shells from the guns used at that date were required to complete the defeat of a ship of the line. What has become of the doctrine of the single blow? It has failed in the case of all three weapons—the gun, the ram, and the Whitehead torpedo. Should not we scrutinise very closely any future claim for it based exclusively on peace experiments, which, as has been shown, have repeatedly misled us in the past?

Returning to the 140 hits before mentioned, and the 55 of which the positions and resulting damage are known, we find that 19 out of the 55 struck the 12-inch and 6-inch gun positions, which gives 13 per cent of the total number of hits. This is the minimum, as there may have been some stopped by the armour and not yet known. In addition, three 12-pounders were struck. Of the 19, one shell burst inside a 12-inch turret and two inside 6-inch casemates, six hit guns, and only three were completely stopped by armour. They put out of action one 12-inch, three 8-inch, and two 6-inch guns; two guns including one 12-pounder failed. Thus seven guns were disabled besides four 12-pounders.

Turning to the difference between the effect produced by 12-inch and 6-inch projectiles, we find that fifteen 12-inch projectiles killed and wounded 155 men, while thirteen 6-inch disabled 69. Of shell known to have burst, eleven 12-inch

averaged 13 casualties, while eight 6-inch yielded 7 each, as against 12 and 13 respectively on August 10. In the first-named action all the shell are believed to have been high explosive; in the last-named there is some doubt as to whether all were so charged. The figures must not be pressed for more than they are worth; they point to the necessity for caution in accepting current doctrines and to the need for inquiry; they seem to indicate that the larger gun has been unduly magnified in the recent past.

Now the main object in battle is to make the enemy believe that he is beaten. The most effective way to do this is to disable his *personnel* and silence his guns. The above results seem to indicate that the smaller gun is by no means to be neglected as an instrument for this purpose. The effect produced depends not only on the size of the projectile, but on the place where it hits. A small shell on the right spot is more effective than a large shell in the wrong one, but to hit the right spot is difficult. Hence in determining the armament of a ship a careful balance must be maintained between the numbers and sizes of the guns carried. Again the facts show that it is misleading to compare the gun power of ships by the total weights of their respective broadsides. To do so is to assume that on the average an 850 lb. 12-inch shell will damage the fighting efficiency of the ship as much as will eight 100 lb. 6-inch. Such an assumption seems not to be true. When the guns in ships of the line were all about the same size the method was legitimate, but it is believed to be entirely misleading at the present time when they differ so much, some being perhaps unnecessarily large and others too small for the work to be done. Are not the numbers and sizes of the guns carried the best and only safe standard of comparison?

Thus we see that whether we consider the difficulty of hitting or the comparative effect produced by shells of different calibres, there are grave doubts whether batteries of comparatively few large guns form the most effective armaments. Any reduction in the size, or change in the disposition, of the guns will at once react on the size of the ship. All vertical armour in existing ships is now perforable by high explosive shell, and does not seem to return sufficient

value for the weight it absorbs and diverts from guns, except against fragments of bursting shell. Moreover ships can be beaten without perforating the armour—*e.g.*, *Orel*. The smallest gun required to maintain the ascendancy over the armour must be carried in sufficient numbers, but should not these be supplemented by others of smaller size to increase the volume of fire and to provide a larger margin for misses and failures? Ascendancy over the armour means that victory can be won in spite of it, that is to say, by perforating it if spread out, and by overwhelming the ships and crew if concentrated.

The precise sizes of these two natures of guns can be settled without difficulty, if the principle is accepted that they should be the smallest which will do the work.

The facts seem to indicate that by making suitable changes in the size and distribution of the guns and by reducing the armour to a minimum, not only may the growth in the size of ships be checked, but a reduction in the present dimensions be expected. To those reduced dimensions will correspond some most suitable speed, beyond which an increase will only be possible at the expense of fighting efficiency. A higher speed will only be obtainable either by reducing the armament of individual ships, while keeping their size, cost, and numbers constant, or by increasing their size and cost, but reducing their numbers. In either case the number of guns in the resulting fleet would be reduced.¹ Our ideal fleet of ships, reduced in dimensions and cost and of corresponding suitable speed, will be more numerous than existing fleets, which is an advantage within limits, and will carry more guns and more men, which are the essentials of victory. The additional number of men does not necessarily mean an increased charge, but points to making arrangements for manning suitable to the new conditions.

An old and well-proved principle underlies the facts laid before you in these and previous papers. That principle gave the English bowmen victory in the Middle Ages, governed Napoleon's use of artillery, and enabled Welling-

¹ The conditions now are different from those in the eighteenth century, when superior speed was obtained by coppering the ships without any sacrifice of guns. Any judgment passed then is now apt to be misleading.

ton's thin red line to defeat Napoleon's columns. The same principle made the three-decker of the past the most powerful instrument of war at sea. The principle is the development of fire effect to the fullest extent possible. The decline in the value of armour and its possible reduction, coupled with the increased range of modern guns, are the changed conditions which enable a return to be made to the old principle.

[TABLES

TABLE I.

AUSTRIAN FLEET AT LISSA on the 20th of July 1866.

Class of Ship.	Name.	Crew.	Dis- place- ment.	Guns (in Viennese lb.)					Total.
				Rifled.		Smooth-bored.			
			Tons.	24.	12.	60.	48.	30.	
Armoured screw frigates.	E. H. Ferdinand Max.	489	5,130	...	...	...	18	...	18
	Habsburg	478	5,130	...	...	...	18	...	18
	Kaiser Max.	385	3,588	14	...	...	16	...	30
	Prinz Eugen	385	3,588	14	...	...	16	...	30
	Don Juan d'Autriche	386	3,588	14	...	...	14	...	28
	Drache	343	3,065	16	...	...	10	...	26
	Salamander	343	3,065	16	...	...	10	...	26
	Seven ships	2811		74	...	...	102	...	176
Unarmoured screw.	Two-decker Kaiser	904	5,194	2	...	16	...	74	92
	Novara	538	2,497	3	...	4	...	44	51
	Schwarzenburg	547	2,514	4	...	6	...	36	46
	Comte Radetzky	398	2,168	3	...	4	...	24	31
	Adria	398	2,168	3	...	4	...	24	31
	Donau	398	2,168	3	...	4	...	24	31
	Corvette. E. H. Friedrich	294	1,474	2	...	4	...	16	22
	Seven ships	3477		20	...	42	...	242	304
Screw gunboats.	Hum	139	869	2	...	...	2	...	4
	Dalmat	139	869	2	...	...	2	...	4
	Wall	139	852	2	...	...	2	...	4
	Velebich	139	869	2	...	...	2	...	4
	Reka	139	852	2	...	...	2	...	4
	Seehund	139	852	2	...	...	2	...	4
Screwschooners.	Streiter	139	852	2	...	...	2	...	4
	Narenta	100	501	2	...	...	...	4	6
	Kerka	100	501	2	...	...	...	4	6
	Nine ships	1173		18	...	...	14	8	40
Paddle avisos.	Kaiserin Elizabeth	166	1,470	2	4	...	...	...	6
	And. Hofer	109	770	1	...	...	...	3	4
	Greif	102	1,260	...	2	...	...	...	2
	Three ships	377		3	6	...	...	3	12
	Twenty-six ships	7838		115	6	42	116	253	532

The Austrian-Lloyd steamer *Stadium* of 1400 tons was also attached to the Austrian fleet.

The 48-pr. steel shot weighed 45 Viennese lb. = 56 lb. English.
 " 30-pr. round shot " 26.5 " = 32 " "
 " 30-pr. shell " 20 " = 25 " "
 " 24-pr. long shell " 52 " = 64 " "
 " 60-pr. shell " 38.5 " = 47 " "

TABLE II.

ITALIAN FLEET AT LISSA on the 20th of July 1866.

Class of Ship.	Name.	Crew.	Dis- place- ment.	Guns in inches.						Total.		
				Rifled.				Smooth- bored.				
				Tons.	10.	8.	6.3.	4.7.	8.		6.3.	
Armoured screw.	Frigates.	Re d'Italia . . .	660	5,700	...	2	30	...	4	...	36	
		Re di Portogallo . .	550	5,700	2	...	26	...	...	...	28
		Ancona . . .	484	4,250	...	...	23	...	4	...	27
		Maria Pia . . .	484	4,250	...	...	22	...	4	...	26
		Castelfidardo . . .	484	4,250	...	...	23	...	4	...	27
		San Martino . . .	484	4,250	...	...	22	...	4	...	26
	Turret- ram.	P. di Carignano . .	440	4,086	...	...	18	...	4	...	22
		Affondatore . . .	290	4,070	2	...	...	...	...	...	3
	Corvettes.	Terribile . . .	356	2,700	...	...	16	...	4	...	20
		Formidabile . . .	356	2,700	...	...	16	...	4	...	20
	Gunboats.	Palestro . . .	250	2,000	...	2	...	1	2	...	5	
		Varesè . . .	250	2,000	...	2	2	...	...	...	4
Twelve ships . . .		5,028			4	6	198	1	34	...	243	
Unarmoured.	Screw frigates.	Duca di Genova . .	580	3,515	...	...	8	...	10	32	50
		Carlo Alberto . . .	580	3,200	...	...	8	...	10	32	50
		Vit. Emanuele . . .	580	3,415	...	...	8	...	10	32	50
		Garibaldi . . .	580	3,680	...	...	8	...	12	34	54
		P. Umberto . . .	580	3,501	...	...	8	...	10	32	50
		Gaeta . . .	580	3,980	...	...	8	...	12	34	54
	Screw cor- vettes.	Maria Adelaide . .	550	3,459	...	...	10	...	22	...	32
		San Giovanni . . .	345	1,780	...	...	6	...	...	14	20
	Paddle cor- vettes.	Guiscardo . . .	190	1,400	...	...	2	...	...	4	6
		E. Fieramosco . . .	190	1,400	...	...	2	...	...	4	6
		Governolo . . .	260	1,700	...	...	...	...	10	...	10
		Eleven ships . . .		5,015			68	...	96	218	382
	Screw gun- boats.	Montebello . . .	63	262	...	...	...	4	...	...	4
		Vinzaglio . . .	63	262	...	...	...	4	...	...	4
Confienza . . .		63	262	...	...	...	4	...	...	4	
Three ships . . .		189			...	...	...	12	...	...	12
Paddle avisos.	Messaggiere . . .	108	1,000	...	...	...	2	...	...	2	
	Esploratore . . .	108	1,000	...	...	...	2	...	...	2	
Two ships . . .		216			...	...	...	4	...	...	4
Twenty-eight ships . . .		10,448			4	6	266	17	130	218	641	

Attached to the Italian fleet were six unarmed ships for various services.

In the above table the numbers of 6.3-inch rifled, and of the 8-inch and 6.3-inch smooth-bored guns, each include guns of two different natures.

TABLE III.

ARMAMENT OF SAN GIORGIO DEFENCES.

Name of Work.	Guns.								Mortars.
	Rifled.			Smooth-bored.					
	30-pr.	24-pr.	12-pr.	48-pr.	30-pr.	18-pr.	12-pr. and below.	60-pr. and 30-pr.	
George .	...	4	...	6	...	4	...	3
Mamula .	4	2	...	...	...	...	...	1
Robertson .	...	1	...	...	...	...	...	...
Bentinck .	...	...	1	...	2	...	4	...
Zuparina .	...	4	...	...	...	...	...	...
Schmidt .	...	2	...	2	...	...	...	...
Wellington	...	...	...	...	...	...	2	4
Madonna .	4	4	...	...	...	...	...	...

30-pr. Rifled shell weighed	?	48-pr. S.B. shot weighed	56 lb.
24-pr. " "	64 lb.	30-pr. " "	32 "
12-pr. " "	?	" " shell	25 "
		60-pr. " "	47 "

TABLE IV.

Name of Ship.	Shots fired.	Hits received.	Killed.	Wounded.	
				Severely.	Slightly.
Ferdinand Max . .	156	42	1	2	5
Habsburg	170	38	...	...	...
Kaiser Max	217	28	...	1	2
Don Juan d'Autriche	277	41	1	...	4
Prinz Eugen	234	21	...	...	1
Drache	121	17	1	5	1
Salamander	211	35	...	2	7
Kaiser	850	80	24	37	38
Novara	342	47	7	3	17
Schwartzenburg . .	286	9	...	2	...
Radetzky	289	...	...	...	...
Adria	221	27	2	3	2
Donau	326	7	1	2	...
Erzherzog Friedrich	250	9
13 gunboats and avisos	606	11	1	2	2
Total	4456	412	38	59	79

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TABLE V.
CHINESE SQUADRON.

SHIP.	Dis- place- ment.	Measured Mile Speed.	GUNS ON ONE SIDE.					Total Torpedo Tubes.	Crew.	
			Calibre.							
			Centimetres.							
			30.5.	25.4.	21.	15.	12.			
			Inches.							
			Tons.	Knots.	12.	10.	8.3.			6.	4.7.
Yung Wei . . .	1350	14.2	...	2	...	...	2	?	125
Chao Yung . . .	1350	14.2	...	2	...	...	2	?	125
Ching Yuen . . .	2300	18.1	...	...	3	1	...	4	260
Lai Yuen . . .	2900	15.5	...	...	2	1	...	4	260
Chen Yuen . . .	7400	15.4	4 (?)	...	...	2	...	3	350
Ting Yuen (Flag)	7400	15.7	4 (?)	...	...	2	...	3	350
King Yuen . . .	2900	15.2	...	...	2	1	...	4	260
Chih Yuen . . .	2300	18.2	...	...	3	1	...	4	260
Kuang Chia . . .	1300	14.2	...	...	...	1	2	?	120
Tsi Yuen . . .	2300	14.5	...	...	2	1	...	4	250
			8 (?)	4	12	10	6			
40										

SHIPS INSHORE AND NOT IN THE LINE.

Ping Yuen . . .	2000	11.0	...	1 ¹	...	1	...	3	200
Kuang Ping . . .	1000	16.5	...	...	...	...	2	4	120

Ships in *italics* had vertical armour protection either for the ship or for some guns or for both.

Sea speeds were probably 20 per cent less than those given.

Small quick-firing and machine guns—some 120 in all—are not shown.

The two gunboats and two torpedo-boats are not included.

¹ 26 centimetres.

TABLE VI.
JAPANESE SQUADRON.

		GUNS ON ONE SIDE.												
		Calibre.												
		SHIP.	Dis- place- ment.	Measured Mile Speed.	Centimetres.								Total Torpedo Tubes.	Crew.
					32.	26.	24.	17.	15.	12.	Q.F.	Q.F.		
					Inches.									
		Tons.	Knots.	12.6.	10.2.	9.4.	6.7.	6.	6.	4.7.				
Flying Division.	Yoshino (Flag)	4150	23	...	...	...	...	3	...	4	5	419
	Takachiho	3700	18.7	...	2	...	...	...	3	...	4	359
	Akitsushima	3150	19	...	...	...	...	2	...	3	4	320
	Naniwa	3700	18.7	...	2	...	...	...	3	...	4	358
Main Division.	Matsushima (Flag)	4200	17	1	...	...	...	...	...	6	4	425
	Chiyoda	2450	19	...	...	...	...	...	...	6	3	313
	Itsukushima	4200	17	1	...	...	...	...	...	6	4	362
	Hashidate	4200	17	1	6	4	362		
	Fusoo	3740	13.2	2	1	353		
	Hi-Yei	2250	14	2	...	3	...	2	308		
	Akagi	620	13	1	1	129		
				3	4	3	3	5	10	31				

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Ships in *italics* had vertical armour protection either for the ship or for some guns or for both.

Sea speeds were probably 20 per cent less than those given.

Small quick-firing and machine guns—some 140 in all—are not shown.

The *Saikio Maru*, armed transport, is not shown.

TABLE VII.
RUSSIAN FLEET IN THE PACIFIC.

SHIP.	Displacement.	Measured Mile Speed.	Guns on one Side.					Total Torpedo Tubes.		Crew.
			12-in.	10-in.	8-in.	6-in.	4.7-in.	Submerged.	Above water.	
Ships of the Line.										
BATTLESHIPS.										
* <i>Petrovsk</i> (V.-A.)	13,541	16.9	4	...	...	6	...	2	4	642
* <i>Tsesarevitch</i> . . .	12,900	18	4	...	...	6	...	2	2	782
* <i>Retvizan</i> . . .	12,900	18.8	4	...	...	6	...	2	4	778
* <i>Sevastopol</i> . . .	11,840	17.0	4	...	...	6	...	2	4	651
* <i>Peresvet</i> (R.-A.) . . .	12,670	18.6	...	4	...	5	...	2	3	776
* <i>Polyuda</i> . . .	12,700	18.5	...	4	...	5	...	2	3	778
* <i>Poltava</i> . . .	10,960	16.3	4	...	...	6	...	2	4	651
			20	8	...	40	...			
ARMOURD CRUISERS.										
† <i>Rossiia</i> . . .	13,670	19.7	...	...	2	7	...	...	5	839
† <i>Rurik</i> . . .	11,690	18.8	...	...	2	8	3	...	6	719
† <i>Gromoboi</i> . . .	13,220	20	...	...	2	8	...	4	...	874
			...	...	6	23	3	...	...	...
Heavy Cruisers.										
* <i>Bayan</i> . . .	7,720	21	...	...	2	4	...	2	...	573
† <i>Rogatuir</i> . . .	6,640	23	...	...	...	8	...	2	4	575
* <i>Diana</i> . . .	6,660	19	...	...	...	5	...	2	1	570
* <i>Pallada</i> . . .	6,820	19.3	...	...	...	5	...	2	1	570
† <i>Varyag</i> . . .	6,500	23	...	...	...	6	...	...	6	570
* <i>Askold</i> . . .	5,900	23	...	...	...	7	...	2	4	573
			...	...	2	35	...	...	...	...
37										

Ships in italics had vertical armour protection either for the ship, or for some guns, or for both.

Sea speeds were probably at least 20% less than those given.

Small quick-firing and machine guns are not shown, except for small ships.

* At Port Arthur. † At Vladivostok. ‡ At Chemulpo. § At Newchuang.
|| On Passage. ¶ At Woosung. ** At Dalny.

TABLE VII.—continued.

SHIP.	Displacement.	Measured Mile Speed.	Guns on one Side.					Total Torpedo Tubes.		Crew.
			12-in.	10-in.	8-in.	6-in.	4.7-in.	Submerged.	Above water.	
Light Cruisers.	Tons.	Knots.								
*Boyarin . . .	3,200	22	...	...	...	4	...	...	5	266
*Novik . . .	3,080	25	...	...	...	4	...	...	5	336
			Total Armament.							
*Vsadnik . . .	430	20	Six 3-pr. ; 3 machine guns.					...	2	65
*Gaidamak . . .	400	20	6-pr. ; 3 machine guns.					...	2	65
*Gremyashchi . . .	1,700	14.5	One 9-in. ; one 6-in. ; four 12-pr. ; six 3-pr. ; four machine guns.					...	2	188
*Otvazhni . . .	1,850	14.2	One 9-in. ; one 6-in. ; four 12-pr. ; six 3-pr. ; five machine guns.					...	2	188
*Gilyak . . .	1,250	12	One 4.7-in. ; five 12-pr. ; four 3-pr. ; two 2½-in. ; three machine guns.					...	1	170
**Dzhigit . . .	1,510	12	Two 6-in. ; four 9-pr. ; four 3-pr. ; one 2½-in. ; six machine guns.					...	1	188
**Razboinik . . .	1,480	13.1	Two 6-in. ; four 9-pr. ; four 3-pr. ; one 2½-in. ; six machine guns.					...	1	186
†Zabiyaka . . .	1,230	14.2	Four 9-pr. ; six 3-pr. ; one 2½-in. ; six machine guns.					...	...	155
||Bobr . . .	1,230	11.2	One 9-in. ; one 6-in. ; six 9-pr. ; two 3-pr. ; one 2½-in. ; four machine guns.					...	...	170
§Sivuch . . .	1,130	11.7	One 9-in. ; one 6-in. ; six 9-pr. ; one 2½-in. ; four machine guns.					...	...	170
¶Mandzhur . . .	1,430	13.3	Two 8-in. ; four 9-pr. ; one 6-in. ; one 2½-in. ; six machine guns.					...	1	179
‡Koreetz . . .	1,270	13.5	Two 8-in. ; one 6-in. ; four 9-pr. ; one 2½-in. ; six machine guns.					...	...	...
* 7 destroyers . . .	350	26	One 12-pr. ; five 3-pr.					...	...	...
* 5 „ . . .	312	26	Do.					...	...	...
* 1 „ . . .	280	33	Six 3-pr.					...	...	...
* 12 „ . . .	240	26	One 12-pr. ; three 3-pr.					...	...	...
†10 torpedo-boats . . .	76 to 120	17 to 20	Two or three machine guns.					...	...	...
„ . . .	23		Nil.					...	...	...
2 mining vessels . . .	...	...	...					...	...	...
4 auxiliaries . . .	...	...	...					...	...	...

TABLE VIII.
JAPANESE FLEET.

FIRST SQUADRON.

SHIP.	Displacement.	Measured Mile Speed.	Guns on one Side.				Total Torpedo Tubes.		Crew.
							Submerged.	Above water.	
First Division.	Tons.	Knots.	12-in.	8-in.	6-in.	4.7-in.			
SHIPS OF THE LINE OR BATTLESHIPS.									
<i>Mikasa</i> (V.-A.) . . .	15,140	18	4	...	7	...	4	...	875
<i>Asahi</i>	15,200	18	4	...	7	...	4	...	835
<i>Fuji</i>	12,450	18	4	...	5	...	4	1	736
<i>Yashima</i>	12,320	18	4	...	5	...	4	1	736
<i>Shikishima</i>	14,850	18	4	...	7	...	4	1	842
<i>Hatsuse</i> (R.-A.) . . .	15,000	18	4	...	7	...	4	...	849
			24	...	38	...			
			62						
Despatch-boat <i>Tatsuta</i> .	850	21	...	...	...	2	...	...	135
Third Division.									
CRUISERS.									
<i>Chitose</i> (R.-A.) . . .	4,760	23	...	2	...	5	...	4	438
<i>Takasago</i>	4,160	23	...	2	...	5	...	5	425
<i>Kasagi</i>	4,862	23	...	2	...	5	...	4	438
<i>Yoshino</i>	4,160	23	...	...	3	4	...	5	419
				6	3	19			
			28						

DESTROYERS.

FIRST FLOTILLA.

Shirakumo } 375 tons.
Asashio }
Kasumi } 363 tons.
Akatsuki }

SECOND FLOTILLA.

Ikadzuchi }
Oboro } 341 tons.
Inadsuma }
Akebono }

THIRD FLOTILLA.

Usugumo } 322 tons.
Shimonome }
Sazanami . 341 tons.

TORPEDO-BOATS.

FIRST GROUP.

No. 69 }
 " 67 } of 88 tons.
 " 68 }
 " 70 }

FOURTEENTH GROUP.

Chidori }
Hayabusa } of 137 tons.
Manadzuru }
Kasasagi }

TABLE VIII.—continued.

SECOND SQUADRON.

SHIP.	Displace- ment.	Meas- ured Mile Speed.	Guns on one Side.			Total Tor- pedo Tubes.		
			8-in.	6-in.	4.7-in.	Sub- merged.	Above water.	Crew.
Second Division.	Tons.	Knots.						
SHIPS OF THE LINE OR ARMoured CRUISERS.								
<i>Idzumo</i> (V.-A.)	9,750	21	4	7	...	4	...	722
<i>Adzuma</i>	9,307	20	4	6	...	4	1	644
<i>Asama</i>	9,750	22	4	7	...	4	1	637
<i>Yakumo</i>	9,646	20	4	6	...	4	1	639
<i>Tokitswa</i>	9,750	22	4	7	...	4	1	642
<i>Iwate</i> (R.-A.)	9,750	21	4	7	...	4	...	688
			24	40	...			
			64					
Despatch-boat <i>Chihaya</i>	1,238	21	...	...	2	...	5	135
Fourth Division.								
CRUISERS.								
<i>Naniwa</i> (R.-A.)	3,650	18	...	5	...	...	4	338
<i>Akashi</i>	2,756	20	...	2	3	...	2	305
<i>Takachiho</i>	3,650	18	...	5	...	...	4	342
<i>Nitaka</i>	3,366	20	...	4	...	...	...	320 (?)
			...	16	3			
			19					

DESTROYERS.

FOURTH FLOTILLA.

Hayatori
Asagiri
Harusame
Murasame } 375 tons.

FIFTH FLOTILLA.

Murakumo
Shiranui
Yugiri
Kagero } 322 tons.

TORPEDO-BOATS.

NINTH GROUP.

Aotaka
Hato
Kari
Tsubame } 137 tons.

TWENTIETH GROUP.

No. 62
,, 63
,, 64
,, 65 } 110 tons.

FLEET AUXILIARIES.

2 Gunboats.
2 Parent ships for torpedo-boats.
2 Repair ships.
1 Hospital ship.

4 Armed merchant cruisers.
6 Fleet auxiliaries.
5 Special as blocking ships.

TABLE VIII.—continued.

THIRD SQUADRON.

SHIP.	Displacement.	Measured Mile Speed.	Guns on one Side.				Total Torpedo Tubes.		Crew.
			12.5-in.	12-in.	6-in.	4.7-in.	Submerged.	Above water.	
Fifth Division.									
CRUISERS.									
<i>Itsukushima</i> (V.-A.)	4,210	16	1	...	...	5	...	4	435
<i>Hashidate</i>	4,210	16	1	...	...	5	...	4	409
<i>Matsushima</i>	4,210	16	1	...	...	6	...	...	435
<i>Chinyen</i>	7,220	15	...	4	3	...	...	3	447
			3	4	3	16			
Sixth Division.									
CRUISERS.									
<i>Idzumi</i> (R.-A.)	2,950	17	...	...	2	3	...	..	296
<i>Suma</i>	2,657	20	...	...	2	3	...	2	304
<i>Akitsushima</i>	3,126	19	...	...	2	3	...	4	309
<i>Chiyoda</i>	2,450	19	...	...	...	6	...	3	316
			...	...	6	15			
Seventh Division.									
MIXED.									
			Total Armament.						
<i>Fuso</i> (R.-A.)	3,718	13	Four 24-cm.; four 6-in.				...	...	358
<i>Kaimon</i>	1,350	12	One 17-cm.; six 12-cm.				...	...	226
<i>Saiyen</i>	2,440	15	Two 21-cm.; one 15-cm.				1	4	237
<i>Heiyen</i>	2,150	10.5	One 26-cm.; four 4.7-in.				...	...	205
<i>Tsukushi</i>	1,350	16	Two 10-in.; four 40-pr.				...	...	164
<i>Banjo</i>	656	10	One 15-cm.; one 12-cm.				...	...	70
<i>Chokai</i>	612	10	Three 4.7-in.				...	...	100
<i>Atago</i>	612	10	Three 4.7-in.				...	...	102
<i>Maya</i>	612	10	Two 15-cm.				...	...	107
<i>Uji</i>	620	13	Light guns				...	...	93
<i>Miyako</i>	1,770	20	Two 4.7-in.				...	2	227

TORPEDO-BOATS.

TENTH GROUP.

No. 43 }
 " 42 } of 110 tons.
 " 40 }
 " 41 }

ELEVENTH GROUP.

No. 73 }
 " 72 } of 110 tons.
 " 74 }
 " 75 }

No. 71, of 88 tons.
 No. 39 } of 110 tons.
 " 66 }

Two attached auxiliary ships.

TABLE VIII.—*continued.*

SHIPS ADDED TO THE FLEET AFTER THE
OUTBREAK OF WAR.

SHIP.	Displace- ment.	Meas- ured Mile Speed.	Guns on one Side.				Total Torpedo Tubes.		Crew.
							Sub- merged.	Above water.	
Ships of the Line.	Tons.	Knots.	10-in.	8-in.	6-in.	4-7-in.			
ARMOUR'D CRUISERS.									
Kasuga	7,628	20	1	2	7	...	...	4	609
Nisshin	7,628	20	...	4	7	...	...	4	609
Cruisers.									
Tsushima . . .	3,366	20	...	...	4	...	...	...	320
Otowa	3,000	21	...	...	2	3	...	...	312

Ships in italics had vertical armour protection either for the ship, or for some guns, or for both.

Sea speeds were probably at least 20 per cent less than those given.

Small quick-firing and machine guns are not shown.

The armament of—

Destroyers was two 12-prs. and four 6-prs.

Torpedo-boats of 137 tons, one 12-pr., and two 6-prs. or three 3-prs.

„ of 110 tons to 88 tons, one or two 3-prs.

TABLE IX.
RUSSIAN FLEET, August 10.

SHIP.	Displacement.	Guns on one Side.					Crew.
	Tons.	12-in.	10-in.	8-in.	6-in.	4.7-in.	
Battleship Division.							
Tsesarevitch (R.-A.) . . .	12,900	4	...	...	6	...	782
Retvisan	12,900	4	...	...	6	...	778
Pobyeda	12,700	...	4	...	5	...	778
Peresvyet (R.-A.) . . .	12,670	...	4	...	5	...	776
Sevastopol	11,840	3	...	...	6	...	651
Poltava	10,960	4	...	...	6	...	651
		15	8	...	34	...	4,416
		Deduct . . .			5		
		29					
		52					
Cruiser Division.							
Askold (R.A.)	5,905	...	...	...	7	...	573
Pallada	6,820	...	...	...	5	...	570
Diana	6,660	...	...	...	5	...	570
		...	...	...	17	...	1,713
Novik	3,080	...	...	...	...	4	336
8 Destroyers . . . . .		...	...	...	...	...	...

N.B.—Five 6-inch guns must be deducted as left behind at Port Arthur.

TABLE X.
JAPANESE FLEET on the 10th of August.

SHIP.	Displacement.	Guns on one Side.					Crew.	¹ Disposition at daybreak. ² Bearing and distance from Encounter Rock.
First Division.								
	Tons.	12-in.	10-in.	8-in.	6-in.	4.7-in.		
Mikasa (V.-A.)	15,140	4	...	...	7	...	875	¹ Off Round Island. ² E. N. E. 27 miles.
Asahi . . .	15,200	4	...	...	7	...	849	
Fuji . . .	12,450	4	...	...	5	...	736	
Shikishima (R.-A.)	14,850	4	...	...	7	...	842	
Kasuga . . .	7,630	...	1	2	7	...	609	
Nisshin (V.-A.)	7,630	...	...	4	7	...	609	¹ South of Cap Island. ² East 16 miles.
		16	1	6	40	...	4520	
Third Division.								
		63						
Yakumo (R.-A.)	9,650	...	...	4	6	...	649	¹ 10 miles S. of Liao-ti-shan. ² W. $\frac{1}{2}$ N. 22 miles.
Kasagi . . .	4,860	...	...	2	...	5	438	
Takasago . . .	4,160	...	...	2	...	5	425	
Chitose . . .	4,760	...	...	2	...	5	438	
		...	...	10	6	15	1947	
Fifth Division.								
		31						
Asama . . .	9,750	...	...	4	7	...	637	¹ Elliot Islands. ² N. E. 50 miles. ¹ Near Sho-hei-to. ² N. by W. $\frac{1}{2}$ W. 17 m. ¹ Odin Cove. ² N. N. E. 26 miles.
Hashidate (R.-A.)	4,120	1	...	...	...	5	409	
Matsushima . . .	4,120	1	...	...	...	5	435	
Chin Yen . . .	7,220	4	...	...	3	...	447	
		6	...	...	3	10	1291	
Sixth Division.								
		19						
Akashi . . .	2,756	...	...	...	2	3	305	¹ Near Encounter Rock.
Suma . . .	2,657	...	...	...	2	3	304	
Akitsushima . . .	3,126	...	...	...	2	3	309	
		...	...	...	6	9	918	
		15						
Idzumi . . .	2,950	...	...	...	2	3	296	¹ Elliot Islands. ² N. E. 50 miles.

1st, 2nd, and 3rd flotillas of destroyers	} 18 destroyers	} Off Port Arthur. At Dalny.		
4th and 5th				
2 groups of torpedo-boats			} 30 torpedo-boats	} Off Port Arthur. Off Sho-hei-to. At Dalny.
4 " " " " " "				

TABLE XI.
THE SQUADRONS AT ULSAN.

SHIP.	Date of Launch.	Displacement.	Measured Mile Speed.	GUNS.								Crew.	Coal carried.
				On one Side.				Total carried.					
				Inches.			Prs.	Inches.			Prs.		
				8"	6"	4.7"	11 or 12.	8"	6"	4.7"	11 or 12.		
		Tons.	Knots.	8"	6"	4.7"	11 or 12.	8"	6"	4.7"	11 or 12.		ONS.
RUSSIAN.													
Rossiia (R.-A.)	1896	13,700	19.7	2	6	...	6	4	16	...	12	839	2,500
Gromoboi .	1899	13,200	20	2	7	...	12	4	16	...	24	874	1,700
Rurik . . .	1892	11,700	18.8	2	8	3	...	4	16	6	...	719	2,000
		38,600		6	21	3	18	12	48	6	36	2,432	
				30				66					
JAPANESE.													
Idzuma (V.-A.)	1899	9,750	21	4	7	...	6	4	14	...	12	722	1,550
Adzuma . .	1899	9,300	20	4	6	...	6	4	12	...	12	644	1,200
Tokiwa . .	1892	9,750	22	4	7	...	6	4	14	...	12	642	1,200
Iwate (R.-A.)	1900	9,750	21	4	7	...	6	4	14	...	12	688	1,550
		38,550		16	27	...	24	16	54	...	48	2,696	
				43				70					

N.B.—Guns below 11-prs. are not shown.

TABLE XII.
RUSSIAN FLEET AT TSU SHIMA.

SHIP.	Displacement.	Measured Mile Speed.	Guns on one Side.					Crew.
	Tons.	Knots.	12-in.	10-in.	8-in.	6-in.	4.7-in.	
Ships of the Line.								
FIRST DIVISION.								
<i>Kniaz Suworov (V.-A.)</i>	13,600	18	4	...	...	6	...	847
<i>Alexandar III.</i>	13,500	18	4	...	...	6	...	840
<i>Borodino</i>	13,500	18	4	...	...	6	...	855
<i>Orel</i>	13,500	18	4	...	...	6	...	855
			16	...	...	24	...	
			40					
SECOND DIVISION.								
<i>Oslabya (R.-A.)</i>	12,600	18	...	4	...	5	...	900
<i>Sisoi Veliki</i>	9,000	16	4	...	...	3	...	662
<i>Navarin</i>	9,500	16	4	...	...	4	...	684
<i>Adm. Nakhimov</i>	8,500	17	...	...	6	5	...	637
			8	4	6	17	...	
			35					
THIRD DIVISION.								
<i>Nicholas I. (R.-A.)</i>	9,500	14.8	2	2 9-in.	...	2	...	739
<i>Adm. Apraxin</i>	4,100	17	...	3	...	...	2	418
<i>Adm. Senyavin</i>	4,100	17	...	4	...	...	2	420
<i>Adm. Ushakoff</i>	4,100	16	...	4	...	...	2	416
			2	13	...	2	6	
			23					
Cruiser Squadron.								
<i>Oleg (R.-A.)</i>	6,670	23	...	...	...	8	...	616
<i>Aurora</i>	6,630	20	...	...	...	5	...	579
<i>Dmitri Donskoi</i>	5,800	16.5	...	...	...	3	5	520
<i>Vladimir Monomakh</i>	6,000	14	...	...	...	2	4	514
			...	...	...	18	9	
			27					
Detached Cruisers.								
<i>Svyetlana</i>	3,860	21.5	...	...	...	4	...	459
<i>Almaz</i>	3,280	19	...	...	...	...	4	305
<i>Izumrud</i>	3,100	23	...	...	...	...	4	350
<i>Zjemchug</i>	3,100	23	...	...	...	...	4	350
			...	...	...	4	12	
			16					
Oural			Armed merchant ship.					

TABLE XII.—*continued.*

FIRST FLOTILLA.		SECOND FLOTILLA.	
Bouinii	} of 350 tons, with one 12-pr. and five 3-prs.	Bodrii	} of 350 tons, with one 12-pr. and five 3-prs.
Bravii		Bezouprestchnii	
Bedovii		Blestchiaschii	
Bystrii		Gromkii	
		Grozni	
Kamtschatka	.	.	Repair ship.
Anadyr	.	.	Transport.
Irtysch	.	.	"
Corea	.	.	"
Rouss	.	.	"
Svir	.	.	"
Orel	.	.	Hospital ship.
Kostroma	.	.	"

Ships in italics had vertical armour protection either for the ship, or for some guns, or for both.

Small quick-firing and machine guns are not shown.

TABLE XIII.

JAPANESE FLEET AT TSU SHIMA.

FIRST SQUADRON.

SHIP.	Displacement.	Measured Mile Speed.	Guns on one Side.					Crew.
	Tons.	Knots.	12-in.	10-in.	8-in.	6-in.	4.7-in.	
First Division.								
SHIPS OF THE LINE.								
<i>Mikasa</i> (A. Togo) . . .	15,140	18	4	...	...	7	...	875
<i>Shikishima</i>	14,850	18	4	...	...	7	...	812
<i>Fuji</i>	12,450	18	4	...	...	5	...	736
<i>Asahi</i>	15,200	18	4	1	...	7	...	835
<i>Kasuga</i>	7,628	20	...	...	2	7	...	609
<i>Nisshin</i> (V.-A. Misu) . .	7,628	20	...	...	4	7	...	609
			16	1	6	40	...	
			63					
Tatsuta	850	21	...	...	...	...	2	135
Third Division.								
CRUISERS.								
Kasagi (V.-A. Dewa) . . .	4,862	23	...	...	2	...	5	438
Chitose	4,760	23	...	...	2	...	5	438
Otawa	3,000	21	...	...	...	2	3	312
Niitaka	3,366	20	...	...	...	4	...	320
			...	...	4	6	13	
			23					

FIRST
FLOTILLA.

Harusame.
Fukubi.
Ariake.
Arare.
Akasaki.

SECOND
FLOTILLA.

Oboro
Inadzuma
Ikadzuchi
Akebono

34½ tons.

THIRD
FLOTILLA.

Shinonome 322 tons.
Usugumo . 322 "
Kasumi . 363 "
Sazanami . 341 "

FOURTEENTH
GROUP.

Chidori
Hayabusa
Manadzuru
Kasasagi

137 tons.

TABLE XIII.—*continued.*

SECOND SQUADRON.

SHIP.	Displacement.	Measured Mile Speed.	Guns on one Side.			Crew.
	Tons.	Knots.	8-in.	6-in.	4-7-in.	
Second Divisions.						
SHIPS OF THE LINE.						
<i>Idzumo</i> (V.-A. Kamimura) . . .	9,750	21	4	7	...	722
<i>Adzuma</i>	9,307	20	4	6	...	644
<i>Tokiwa</i>	9,750	22	4	7	...	642
<i>Yakumo</i>	9,646	20	4	6	...	639
<i>Asama</i>	9,750	22	4	7	...	637
<i>Fwate</i> (R.-A. Shimamura) . . .	9,750	21	4	7	...	688
			24	40	...	
			64			
Chihaya	1,238	21	...	...	2	135
Fourth Division.						
CRUISERS.						
Naniwa (V.-A. Uriyu)	3,650	18	...	5	...	338
Takachiho	3,650	18	...	5	...	342
Akashi	2,756	20	...	2	3	305
Tsushima	3,366	20	...	4	...	320
			...	16	3	
			19			

FOURTH FLOTILLA.	FIFTH FLOTILLA.	NINTH GROUP.	NINETEENTH GROUP.
Asagiri } Murasame } Asashio } Shirakumo }	Shiranui } Murakumo } Yugiri } Kagero .	Aotaka } Kari } Tsubame } Hato }	Kamome } Otori } Kiji .
375 tons.	322 tons. 279 tons.	137 tons.	137 tons. (?)

TABLE XIII.—continued.

THIRD SQUADRON.

SHIP.	Displacement.	Measured Mile Speed.	Guns on one Side.				Crew.
	Tons.	Knots.	12.5-in.	12-in.	6-in.	4.7-in.	
Fifth Division.							
CRUISERS.							
<i>Itsukushima</i> (V.-A. Kataoka)	4,210	16	1	...	...	5	435
<i>Chinyen</i>	7,220	15	...	4	3	...	447
<i>Matsushima</i>	4,210	16	1	...	...	6	435
<i>Hashidate</i> (R.-A. Taketomi)	4,210	16	1	...	...	5	409
			3	4	3	16	
			26				
<i>Vazyama</i>	1,584	20	...	...	...	2 ?	228
Sixth Division.							
CRUISERS.							
<i>Suma</i> (R.-A. Togo)	2,657	20	...	...	2	3	304
<i>Chiyo-da</i>	2,450	19	...	...	...	6	316
<i>Akitsu-shima</i>	3,126	19	...	...	2	3	309
<i>Idzumi</i>	2,950	17	...	...	2	3	296
			...	...	6	15	
			21				
Seventh Division.							
Total Armament.							
<i>Fuso</i> (R.-A. Yamada)	3,718	13	Four 24-cm. ; four 6-in.				358
<i>Takao</i>	1,750	15	Four 15-cm.				223
<i>Chokai</i>	612	10	Three 4.7-in.				100
<i>Tsukushi</i>	1,350	16	Two 10-in. ; four 40-pr.				164
<i>Maya</i>	612	10	Two 15-cm.				107
<i>Uji</i>	620	13	Light guns.				93

FIFTEENTH GROUP.	TENTH GROUP.	ELEVENTH GROUP.	TWENTIETH GROUP.	FIRST GROUP.
Hibani	No. 43	No. 73	No. 65	No. 69
Sagi	" 40	" 72	" 62	" 70
Hashitaka	" 41	" 74	" 64	" 67
Uzuru	" 39	" 75	" 63	" 68
137 tons.	110 tons.	110 tons.	110 tons.	88 tons.

*The Ship of the Line in Battle.*TABLE XIII.—*continued.*

DIVISION OF SPECIAL SHIPS.

Under Rear-Admiral Ogura, with his flag in the *Daichu Maru*.

24 hired Merchant Ships ranging from 300 to 6,500 gross tons.

IN THE STRAITS OF KOREA (LOCAL FORCE).

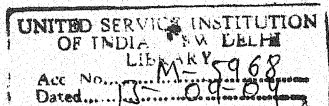
SEVENTEENTH GROUP.	SIXTEENTH GROUP.	EIGHTEENTH GROUP.	FIFTH GROUP.
No. 34 " 31 " 32 " 33	Shirataka. No. 66 (under repairs).	No. 36 " 35 " 60 " 61	Fukuriyu 111 tons. No. 25 . 94 " " 26 . 81 " " 27 . ? "
} 81 tons.			

The ships in italics had vertical armour protection either for the ship, or for guns, or for both.

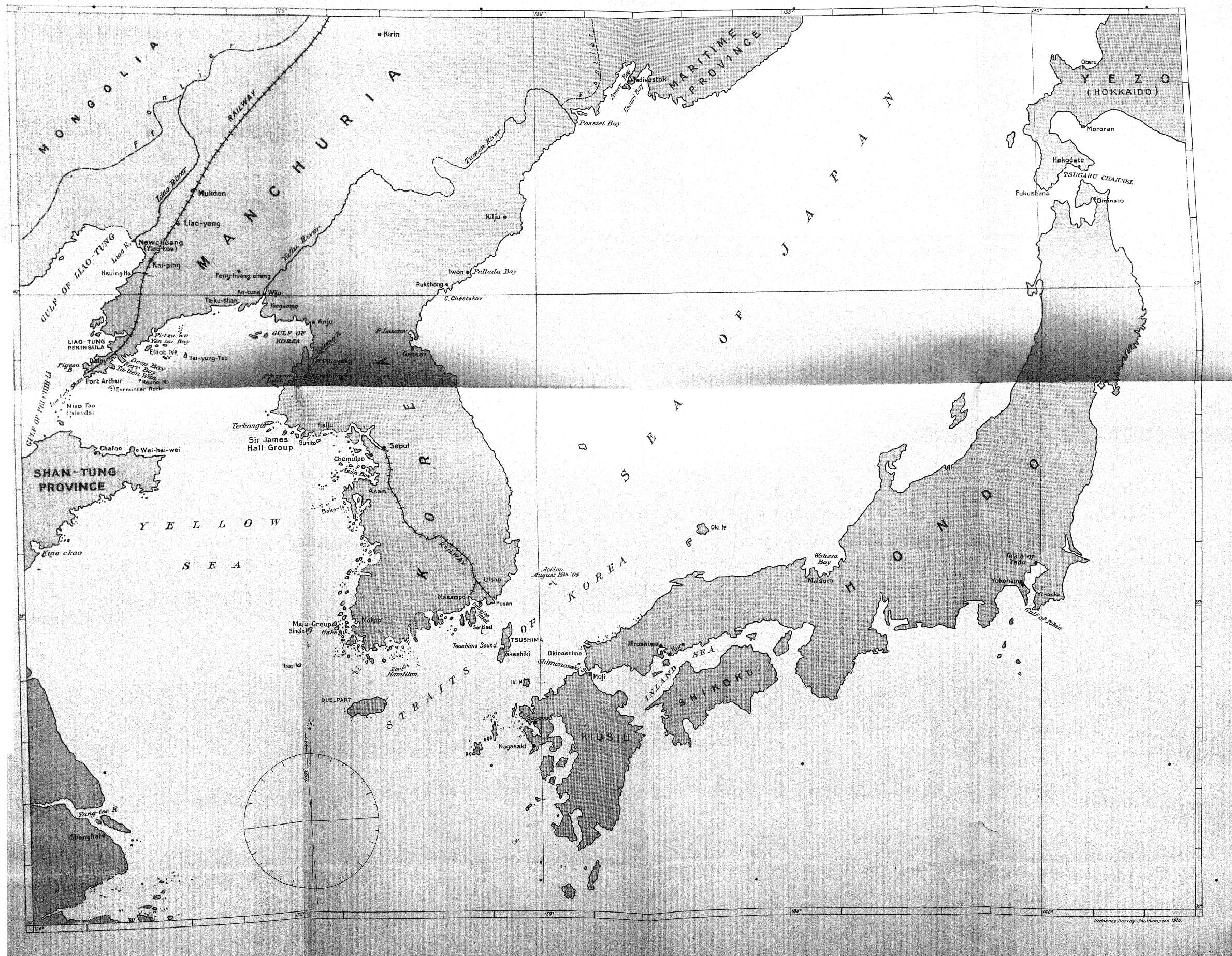
Small quick-firing and machine guns are not shown.

TABLE XIV.
WHITEHEAD TORPEDO WAR RESULTS.

Date.	From Ship.		At Ship.		Number which took Effect	Remarks.
	Number fired.	Destroyer or Torpedo-boat.	Under Weigh.	At Anchor or Stopped.		
<i>By the Japanese.</i>						
1904.						
Feb. 8 .	2	Destroyers .	All . .	...	Nil	At Koreetz.
Feb. 9 .	18	Do.	...	Anchor . . .	3	At ship outside Port Arthur.
Various .	16	Do.	Doubtful	...	Nil	During attacks on Port Arthur.
June 23 .	60 to 70	Destroyers and torpedo-boats	Some .	Most at anchor	...	Japanese torpedo-boat hit, but did not sink.
July 24 .	2	Picket boats .	...	At anchor . .	2	One Russian destroyer sunk, one damaged.
Aug. 10 .	70 to 80	Destroyers and torpedo-boats	All . .	...	...	Japanese torpedo-boat hit, but did not sink.
Dec. 9-16	98	Torpedo-boats	...	At anchor . .	4	Sevastopol, Serdityi.
1905.						
Jan. 27-8	Say 90	Destroyers and torpedo-boats	All . .	...	8	Souvorov, Navarin, Nakhimov, Monomakh.
<i>By the Russians.</i>						
Feb. 9 .	2	Ships . . .	2	...	Nil	By Novik.
March 28	2	Destroyers .	...	Stopped . .	2	At blocking ships.
April 13 .	1	Do.	1	...	Nil	By Strashni.
" 25 .	1	Torpedo-boat	...	Anchor . . .	1	At Goyo Maru.
" " .	2	Ship . . .	...	Stopped . .	2	At Kinshu Maru.
June 15 .	1	Do.	Do. . . .	1	At Hitachi Maru.
" " .	2	Do.	Do. . . .	2	At Sado Maru, did not founder.
Aug. 14 .	1	Do. . . .	1	...	Nil	By Rurik.



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